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MODEL AIRPLANE NEWS

THE WORLD'S PREMIER R/C MODELING MAGAZINE

48120

SHOW SPECIAL—R/C'S HOTTEST YEAR!

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Build without plans

Create custom graphics

FLORIDA JETS
TURBINE TAKEOVER!

Reviewed

Falcon 46, Century's low $$ heli

Tutor, Norvel's ½A trainer

July 1999

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CONSTRUCTION

Build the Kombat Komet

MODEL AIRPLANE NEWS
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CONTRIBUTORS
Dave Baron, Rick Bell, Joe Beshar, Mike Billinton, Bernard Cawley, Roy L. Clough Jr., Don Edberg, Guy Fawcett, Dave Garwood, Dave Gierke, Greg Gimlick, Henry Haffke, Greg Hahn, Tom Hunt, John Kauk, Michael Lachowski, Andy Lennon, George Leu, Mike McConville, Tim McDonough, Jerry Nelson, Jim Newman, Jim Onorato, Dave Patrick, Dave Platt, Randy Randolph, Jef Raskin, Carl Risteen, Jim Ryan, Jim Sandquist, Jim Simpson, Faye Stilley, Craig Trachten, Roy Vaillancourt, George Wilson, Dan Wolanski, Nick Ziroli.

AirAGE
100 East Ridge, Ridgefield, CT 06877-4606 USA
(203) 431-9000 • fax (203) 431-3000
Email *man@airage.com*
Internet *www.modelairplanenews.com*

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ON THE COVER: main image—contributor and photographer Rich Uravitch captured Dean Lassek's 48-pound A-10 on film at the third annual Florida Jets; insets: (top) the Hobbico Extra 300 ARF is a great aerobatic model for pilots who don't have a lot of time to build (photo by Tony Newsom); Mike Leasure's Kombat Komet is a 1/12-scale foam and wood Messerschmitt that's ideal for combat or sport flying (photo by Mike Leasure).

Features

Columns

Construction

Reviews

Departments

The World's Best Selling 1/2-A R/C Laser Cut Kits

Piper J-3 Cub

48" Span
3 Channels
Engine: .049 - .061

All Herr kits are Made in the U.S.A.

AT-6 Texan

36" Span
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Engine: .049 - .061

Aqua-Star Seaplane

42" Span
2 - 3 Channels
Engine: .049 - .061

Star Cruiser Sport/Trainer

42" Span
2 - 3 Channels
Engine: .049 - .061

Cherokee Sport/Trainer

42" Span, 2 - 3 Channels, Engine: .049 - .061

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EDITORIAL

BY TOM ATWOOD

R/C's hottest year ever!

At this year's annual R/C airplane trade show in Toledo—very well run, as always, by the Weak Signals R/C Club—the mood was upbeat, and the floor was flooded with new products. The sheer diversity was astounding, as you'll see when you peruse Chris Chianelli's special, five-page "Air Scoop" in this issue. The variety of new products ranged from a 1.3-ounce airplane from SR Batteries that can be R/C'd with an infrared system from Ztron, to a 16hp, 9.51ci Power Master 3W150i B2 gasoline-ignition engine—and there was an abundance of new kits, ARF and ARC airframes in nearly every size.

The indicators of dynamic growth for the R/C hobby reached beyond the dazzling array of new products—technology also continues to advance at a remarkable speed. Norvel, the now-famous company that has revolutionized the ½A engine community, introduced an all-new, .25 2-stroke engine with a ceramic matrix on the inside surface of the cylinder that lightens the engine and speeds cooling. AstroFlight introduced a tiny .010 brushless motor (1A draw on 5 or 6 cells) for indoor and small outdoor airplanes that has an electronic control attached to the back of the motor bell. The relatively new Airtronics RD6000 radio, although introduced prior to the show, is an example of how computer-processing power goes up as cost goes down—and there were other examples of this general principle from Futaba, JR and Hitec. New high-torque, precision-centering digital servos have come on the market in the last year, as have ultra-miniature microservos. And waiting in the wings to debut its radios in the U.S. later this year is Multiplex, the German R/C radio giant.

The miniaturization of electronics (see the discussion about the Hitec and FMA microservos in this issue's "Airwaves" department) and the ever improving glow- and electric powerplants for small planes may be helping to drive the groundswell in backyard, cul-de-sac and park "slow fliers." With time at a premium in so many people's lives as we approach the millennium, this new breed of small and slow-flying R/C aircraft may be poised for significant growth. The buzz at the show was that many more of these craft are in the planning stages.

While I'm on the subject of time, the emergence of "completely built" airplanes—with engines, radio receivers and servos installed—is providing still another solution that lowers barriers to entering our hobby. One vendor, Ace Hobby Distributors, offers eight of these kits (Thunder Tiger aircraft), and three more with servos and engine installed (but without a receiver). This, of course, is taking the ARF concept another leap forward, even as flight simulators such as Great Planes' "Real Flight" help the novice pilot avoid damaging his investment (on-screen crashes of airplanes and helicopters don't hurt the wallet!). This multifaceted technological growth and the apparent general upswing in the industry all spell more value for the consumer and easier entry into even more segments of the hobby and sport.

We at *Model Airplane News* are committed to keeping you informed of these exciting developments in R/C. Stay tuned for product surveys and reviews as we track forward, and look in this issue for a hint of things to come.

HIGHLIGHTS

Inside, don't miss Rich Uravitch's Florida Jets coverage; he gives us a look at new developments in the fast lane. And for those of you who—like the editors of this magazine—still spend a lot of quality time in your shop, see our how-to's on matching props to airplanes (Chris Chianelli and Dave Gierke offer complementary advice), and other features on building spinners, steerable landing gear, concealed mufflers and more!

AIR SCOOP

Norvel Offerings

One of the hottest items at the Toledo show was Norvel's foamboard fold-up model (www.foldingflyer.com). In only 2½ hours, you can cut and fold the approximately 2-foot-square board, which has attractive red, blue or yellow markings on one side and plans on the other, into a fun-fly model. Add a Norvel .061 engine or Speed 400 motor with gearbox and 2- or 3-channel radio and hardware, and you're ready for the field. You can add landing gear, too, but it isn't required. Only $19.99 each; package of three for $49.99.

A new Norvel engine, the .25 Revlite (www.norvel.com), is a breakthrough in R/C powerplant design and features "ceramic-piston cylinder technology." Without getting into the nuts and bolts, this makes the engine 20 to 25 percent lighter than a similar size ABC engine and provides superior cooling and better fuel economy. Those in the know say the .25 Revlite will be reviewed in a future issue!

Also introduced was the Neofun by Norvel (www.neofun.com) ARF. Available in two color schemes (black-and-red Vision and traditional stripe-and-checkerboard Classic), the model uses a 2- or 3-channel radio and Norvel .049 or .061 for more spirited flight characteristics. The retail price is $84.99.

Electric Jet Factory

Now, here's a new company to watch: these guys had the coolest prefinished, electric ducted-fan-powered foam scale jets I've ever seen. Sources unrelated to the company tell me that these jets fly well, too.

Pictured here is a 1/20-scale, 28.7-inch-wingspan A-7 Corsair II that represents just one of the Flying Styro line offered by Electric Jet Factory (EJF), and it retails for only $69.95. The A-7 is 23.3 inches long, weighs 13 to 15 ounces ready to fly and is powered by the HiLine Red Flame Blaster (Speed 400) fan unit, also pictured here. The unit calls for either 7, 800AR or 8, 800AR cells. The fan/motor combo retails for only $29.95.

Also shown is a lightweight, epoxy-glass fuselage and presheeted foam-wing Rafale that represents another line of models offered by EJF. The Rafale specs are: wingspan—33 inches; length—39 inches; weight—49 ounces; and power requirements—two Mini 480-size fan units.

Electric Jet Factory; distributed by Animated Objects Inc., 8929 N. Ferber Ct., Tucson, AZ 85742; (520) 579-5609; fax (520) 579-5610.

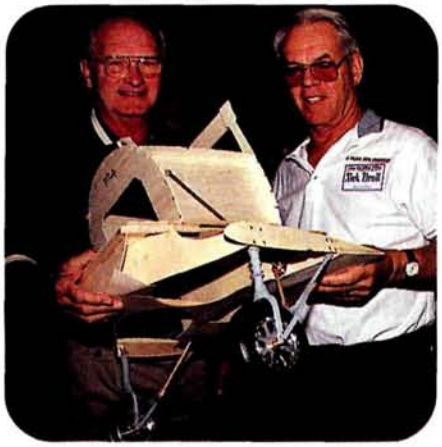
Faye Stilley: still the Reigning MonoKote King

Though the competition at Toledo this year was very tough, our own Faye Stilley retained his MonoKote-king crown. When asked about the level of craftsmanship in the "Best MonoKote Finish" category, Faye replied humbly that all the entries were of the highest caliber, and victory is hardly a sure thing. Faye's winning model, if you can believe it, is a modified Lanier Stinger!

P-40 Sneak Peek

Chi Chen Tse of Yellow Aircraft is holding the fuselage to the company's new, 86-inch-wingspan Curtiss P-40 Warhawk. The kit will call for an engine such as a Moki 1.8 or 2.1 glow or U.S. 41 gas/ignition. It's a foregone conclusion that the P-40 will receive the super-high-quality glass work that Yellow is known for. An example of that fine work is shown here in the prefabricated, carbon-fiber-reinforced internal duct work of Yellow's StarFire—simply awesome!

AIR SCOOP



Robart Staggerwing Gear

Robart always has something retractable to show off at Toledo, and this year, we spied a very interesting mock-up. Still in the development stage, this gear is designed for Nick Ziroli's newest design: an 80-inch-span Beechcraft D-17D Staggerwing (also under development). The retracts will feature scale, screw-drive operation and will be electrically driven—a new approach for Robart. Stay tuned for more developments.

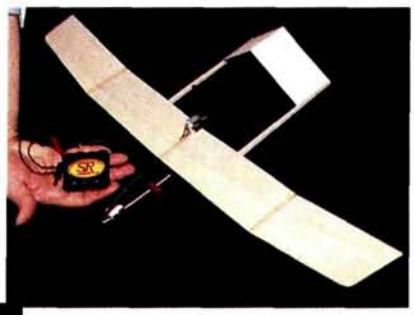
New Gearboxes and Motor from AstroFlight

AstroFlight showed off its trio of firewall-mountable "hexbox" gearboxes for .035 to .40 motors. Additionally, AstroFlight's new "Mighty Micro" brushless .010 motor for *indoor* and small outdoor aircraft turns a 4-inch Cox propeller at 9,000rpm while drawing only 1 amp from a 5- or 6-cell pack. AstroFlight also showed a new line of planetary gearboxes for .035 to .15 motors.

AstroFlight Inc., 13311 Beach Ave., Marina del Rey, CA 90292; (310) 821-6242; fax (310) 822-6637; website: www.astroflight.com.

Innovative Aircraft from SR Batteries

This 26-inch-span X70 cutie is a "micro-laser-cut" balsa kit that weighs an amazing 1.3 ounces with all its electronics installed. When was the last time you bought a kit for $9.95! Also shown is a "charger" battery that will power up the X70 for up to 3-minute flights. And you can R/C this bird with one of the neat infrared controllers from Ztron, 171 Arundel Rd., Paramus, NJ 07652; or look on the web at http://home.att.net/~szigras. SR's new series of aircraft includes a 36-inch-span low-wing (X250), and some fabulous molded balsa/glass gliders spanning 86 to 125 inches!



SR Batteries Inc., Box 287, Bellport, NY 11713; (516) 286-0079; fax (516) 286-0901.

16 Horses from Cactus Aviation

That's 16 horsepower in the form of the new Power Master 3W150i B2 gasoline-ignition engine from Cactus Aviation. Available in either front or rear induction, this 9.15ci powerplant weighs in at only 8.47 pounds and easily turns a 30x12 or 32x12 prop! If you're looking for some serious ponies to pull your TOC-style aerobat or giant-size scale bird, this could be the "firewall-forward" solution you've been looking for.

Cactus Aviation, 10380 E. Heritage, Tucson, AZ 85730; phone/fax (520) 721-0087; website: www.pclink.com/cactus.

Lanier's Littlest Shrike

Following the success of the .15-size Shrike designed by Joe Beshar, Lanier's new ½A Shrike is just as cool as can be. The all-wood, laser-cut kit includes parts for either a ½A glow version or a Speed 400 electric-powered version. The littlest Shrike spans a bit more than 2 feet and has 162 square inches of wing area; flying weight is 14 to 19 ounces. For the backyard flier, this could be the answer for fun, at-home air defense!

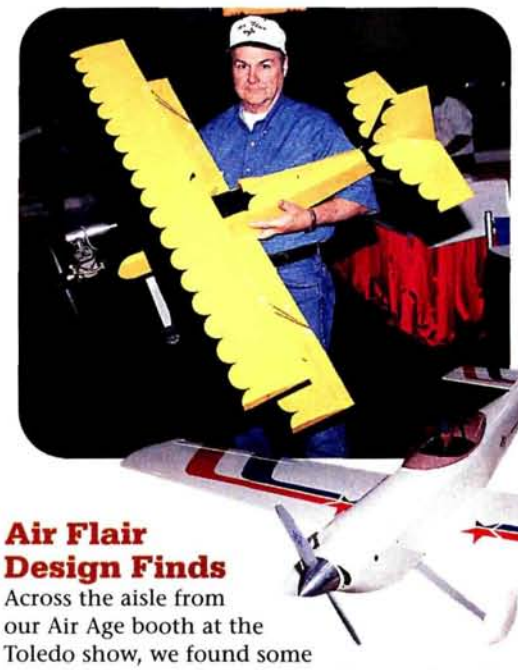
Lanier RC, P.O. Box 458, Oakwood, GA 30566; (770) 532-6401; fax (770) 532-2163.

Hitec: the Torque of the Town

If servo speed and strength are your quests, you'll be pleased to hear that Hitec premiered its first coreless, standard-size, all-metal-gear Ultraspeed servo, HS-925MG; it boasts a 0.08-second transit time with 102 oz.-in. of torque! Want more muscle? How about the HS-945 MG, which has the brawn of 152 oz.-in. and 0.12 second. Hitec also showed a new piezo gyro for airplane and helicopter use that weighs only 24.64 grams. Call for more details!

Hitec RCD, 12115 Paine St., Poway, CA 92064; (858) 748-1767; website: www.hitecrcd.com.

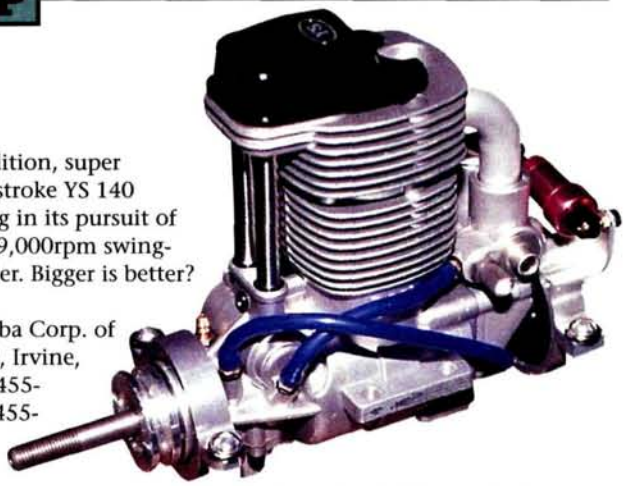
AIR SCOOP



More Power to You from YS

Check out this limited-edition, supercharged, fuel-injected, 4-stroke YS 140 Limited. It wastes nothing in its pursuit of power, and it rates up to 9,000rpm swinging up to a 16x14 propeller. Bigger is better? YS thinks so!

YS; distributed by Futaba Corp. of America, P.O. Box 19767, Irvine, CA 92723-9767; (949) 455-9888; fax (949) 455-9899.



Air Flair Design Finds

Across the aisle from our Air Age booth at the Toledo show, we found some really interesting designs. Don Riggin of Air Flair Inc. showed us two of his company's newest models: the Skymaster 60 biplane and the Short Cut. The Skymaster is an all-wood kit that features machine-cut parts and an aluminum landing gear. Intended for .45 to .60 2-stroke engines, the biplane has a 54-inch span. Don says that when it's powered by a SuperTigre .61, the Skymaster lives up to its name.

The 69-inch-wingspan Short Cut is a .60-size version of the popular Prime Cut. Designed to use a .60 to .65 2-stroke or a .90 4-stroke engine, the model features foam wing-cores, a foam fuselage turtle deck, a fiberglass engine cowl and wheel pants, and a formed canopy. Looking very much like a sport-scale RV-4, the Short Cut is an attractive sport flying machine.

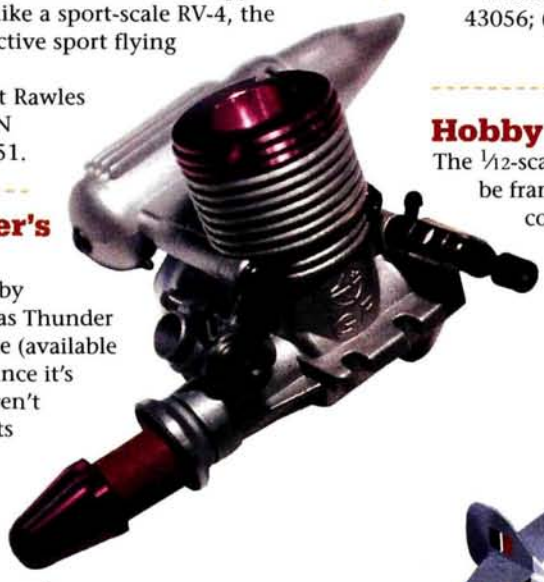
Air Flair, 9351 East Rawles Ave., Indianapolis, IN 46229; (317) 897-5551.

Para-Cat Offers 9 Lives for your Trainer

Now you can own a purpose-built parachute recovery system for your .40- to .60-size trainer. The transmitter-activated ABS plastic and rip-stop nylon Para-Cat can deploy its parachute from high-speed flight, dives, spins, even inverted flight! It has an automatic-shut-down module (ASDM) that will simultaneously kill your engine when it deploys.

Wildcat R/C Fuels, 3005 Park Central, Bldg. W, Nicholasville, KY 43056; (888) 815-7575.

Thunder Tiger's Kitten



Spied in the Ace Hobby Distributors booth was Thunder Tiger's new .07 engine (available later this summer). Since it's brand-new, specs weren't available; but given its reputation for aircraft engines, you know that where there's Thunder, there will definitely be lightning performance!

Thunder Tiger USA; distributed by Ace Hobby Distributors, 116 W. 19th St., P.O. Box 472, Higginsville, MO 64037; (660) 584-7121; fax (660) 584-7766.

Hobby Hangar Hawkers

The 1/12-scale, .15- to .25-size Hawker Tempest and Typhoon models can be framed up in as few as 10 hours and can be used for competition combat or dressed up with scale details such as fixed landing gear, wing fillets, exhaust stubs and functional rudder. No matter how you fly them, the planes are stable and versatile, and the power choice is yours: a geared, electric .05, a .15 to .25 2-stroke or a .26 to .30 4-stroke.

Hobby Hangar, 1862 Petersburg Rd., Hebron, KY 41048; (606) 334-4331; website: www.hobbyhangar.com.

AIR SCOOP

At the Great Planes Booth ...

... the first to catch my eye was the cute SlowPoke. Its small size and appearance make me think of it as the offspring of an Astro Hog and a Lazy Bee. I love it. It's an all-wood kit that reportedly builds fast, flies very slowly and can be packed up for the vacation trip. What could be better? Specs are: engine requirements—.15 to .25 2-stroke or .26 4-stroke; wingspan—50 inches. With a wing area of 656.5 square inches and a flying weight of 2.5 to 3.5 pounds, the SlowPoke has an incredible wing loading of 8.8 to 12.3 ounces per square foot; that says it all.

For the duration of the show, Great Planes' RealFlight Deluxe drew a crowd. Why? Everyone wanted their turn at the new heli simulator. The RealFlight aircraft flight simulator has been so successful, you knew this had to happen. Ten heli designs (including electric- and glow-powered sport, scale and competition models) are available. Like the RealFlight Deluxe aircraft program, the heli program features CD-ROM disc with exclusive TransVision graphics that allow you to actually see the servos inside the heli. The helis even emit smoke, just like the real machines! I had to learn to fly the old-fashioned way—crash and rebuild, crash and rebuild. Today, I know so many fliers who have practiced with RealFlight during the winter months and had success on their maiden voyage that first spring day at the field. How great for our hobby.

I thought I would also show you guys a prototype of this gorgeous Stinson Reliant. I can't tell you much right now, other than that it is going to be big. I have a feeling that the Stinson represents a new edition of kits that are going to be the next plateau for Great Planes.

Great Planes Model Distributors, 2904 Research Rd., Champaign, IL; (217) 398-6300; fax (217) 398-0008.

SOBOX Accent-400

You won't see many other gliders at the field that feature this kind of wing construction. The criss-cross, slotted balsa ribs make the wing very strong and stiff. The leading edge and spars are carbon-fiber tubes, and the trailing edge is balsa. The wings and tail are covered with Oracover, and the fuselage is painted fiberglass. This ready-to-fly model needs only a radio and a motor; it is also available in a hand-launch glider version.

Specs: wingspan—59 inches; length—34.5 inches; wing area—401.5 square inches; weight—8.64 ounces; airfoil—S-7032.

SOBOX, 630 Evans Ave., #34, Toronto, Ontario, Canada M8W 2W6; phone/fax (416) 259-5336; email: sobox@idirect.com.

Bob Dively P-38 Cockpit Interior

What can turn a nice scale model into something extra special? A finished cockpit! Bob Dively Models offers more than 40 different cockpit interiors for the most popular scale models, and its newest offering was released at Toledo: one that's specially designed for Nick Ziroli's P-38. Made of vacuum-formed plastic, the interior comes with instrument decals and needs only to be assembled and painted. For the ultimate in scale realism, add a few assorted pins as levers and knobs.

BVM Aeropoxy

Certain models, such as jets and giant-scale warbirds, represent significant investments. Moreover, turbine and fan-power jets put an airframe under considerable stress. It seems wise to choose the highest-grade epoxy you can get your hands on to hold these expensive models together. Lower-quality glues *do* deteriorate as they age; don't ever doubt it. Aeropoxy is a thixotropic, slow-curing, aerospace-grade, 2-part epoxy system. "Thixotropic" means that it stays where you put it; it won't run down and puddle at the bottom of your fuselage. It can be sanded yet will not chip off easily. It is excellent for composites such as fiberglass and carbon fiber. And Aeropoxy comes with a high-quality glue gun and two sizes of auto-mix nozzles.

BVM, 170 State Rd. 419, Winter Springs, FL 32708; (707) 327-5020; website: bvmjets.com.

AIRWAVES

Our readers write back

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," MODEL AIRPLANE NEWS, 100 East Ridge, Ridgefield, CT 06877-4606 USA; email man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we can not respond to every one.

THANK YOU!

In the February '99 issue, we asked you—our readers—to share your thoughts about the magazine and your modeling interests in our "Readers' Survey Sweepstakes." Your response was tremendous; we received more than 3,000 surveys and letters from readers throughout the country and around the globe. We are now busy compiling the data, which we'll share with you in a future issue. On behalf of all the editors, thank you for taking the time to help us make *Model Airplane News* an even better magazine.

We also thank Great Planes and AstroFlight who generously provided our first-place winners with an O.S. .91 Surpass engine and an 020 brushless motor. DS

1ST PLACE

Sam Haye	Bakersfield, CA
Wayne Hanber	Ames, IA

2ND PLACE

Charles Everett	Savanna, OK
Dave Bender	Lewis, NY
Jim Gordon	Stoutsville, OH

3RD PLACE

Gene Norman	Forest Park, GA
R. Jairam	Sunrise, FL
Daniel M. Hester	Lebanon, CT
John T. Else	Camdenton, MO
Dr. Richard L. Anderson	Jackson, MI
Bjornar Brun	Morhued, Norway
Ray Dredge	Bellingham, WA
Peter M. Montefusco	Dover, DE
Leonard B. Lechler	Fort Worth, TX
David D. Long	Lino Lakes, MN
K.R. Smith	Capetown, South Africa
Luc Blanchard	Windsor, Ontario,Canada
Milton Hehr	Kansas City, MO
Friedrich Burk	Buckenhof, Germany
Saso Babic	Iorija, Slovenija

4TH PLACE

Edward L. Jordan	Gaithersburg, MD
Jacques Petitclerc	Quebec City, Quebec, Canada
J. Kluytmans	Oss, Holland
James H. Killeen	Sebring, FL
Edward P. Hillen	Mastic, NY
Petri Miettinen	Kirkkonummi, Finland
Richard Sudermann	Spokane, WA
Jerry Ledford	Hollywood, FL
Leslie J. Mason	Santa Ynez, CA
Ole Olson	Devils Lake, ND
Ron Wallace	Redmond, OR
Wade L. Zinck	Scott's Point, Nova Scotia, Canada
Carlos Alberto Bazarello	Cons. Lafaiete, Brazil
Russ Watts	Destin, FL
A. Scott Grove	Wilmington, OH
Tom Rotella	Suffern, NY
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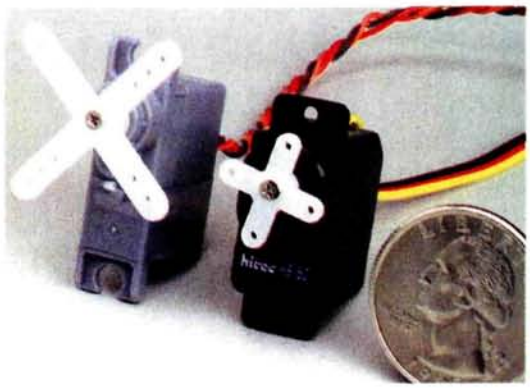
William Buttry	Sikeston, MO
Don Seligman	Campbellsburg, KY
Carlton Beasley	Weatherford, OK

SEARCH FOR SMALL SERVOS

I'm a kite flier who wants to attach an R/C camera to my line. I understand that there are companies (perhaps your advertisers) that manufacture tiny servos that would be ideal for this. Do you have any leads on how I can find such companies?

ED JOHNSON
Wayne State College, Wayne, NE



I've often wondered if servos are shrinking because R/C'ers are flying smaller models or if the smaller models are a result of the tiny servos now available. In any case, Ed, you're right; the small, light servos now on the market would be ideal for your application.

Two companies offer microservos: Hitec RCD, (619) 258-4940 or www.hitecrcd.com, and FMA Direct, (301) 831-8985 or www.fmadirect.com. Hitec's HS-50 Feather servo and FMA's S60 servo each weigh less than 0.20 ounce and are less than an inch long. Happy kite flying! DS

NO FUELIN' AROUND

A hangar flying discussion brought up the topic of fuel, and it seems there is a (truthful?) practice of using standard 2-cycle glow fuel in 4-cycle R/C engines. No, I have not been brave enough to try it. Can you briefly tell us the differences between 2- and 4-cycle fuel and whether they are interchangeable, albeit with some sacrifice in performance?

I've been out of the hobby for 25 years, so it's interesting to see the progress made. I appreciate *Model Airplane News* and each month look forward to all the interesting info you provide.

BILL KELLER
Cranbury, NJ

While leaving the scientific debate over 2- and 4-stroke engine fuel to the experts in the field, I conducted an informal survey of the Model Airplane News *staff. To an editor, all use 2-stroke fuel in their 4-stroke engines. Although 2-stroke fuel does have a higher oil content and produces more residue as it burns, it's perfectly safe for 4-strokes. We recommend 10- to 15-percent nitro with 15- to 18-percent oil, preferably with a touch of castor to protect the 4-stroke from internal corrosion.* DS

CLEVELAND MODEL & SUPPLY CO.

Hello and help! I was active in the hobby some years back and discovered Cleveland Model & Supply Co. plans through *Model Airplane News*. In the early '90s, I had ordered a plan from Mr. Packard and was quite pleased with the detail.

I am now getting back into the hobby (particularly small-scale rubber/gas/electric FF and static display conversions), and I'm trying to track down plans (or a kit!) for a Mustang Midget M-1. I remember an offering in the Cleveland lineup (no. EZ-118, a 16-inch job). I don't want to send a blind order, so please advise whether Cleveland Models still exists and how to contact them, or are there other 16- to 30-inch plan/kit offerings for the Mustang M-1? [email]

STEPHEN YATES

Unfortunately, Ed Packard recently passed away, but his legacy lives on. The company still exists and can be contacted at P.O. Box 55962A, Indianapolis, IN 46205-0962; (317) 257-7878. DS

ERRATUM

On page 32 of the May 1999 issue, we incorrectly reported that the jet in the lower right-hand photo was a Jet Hangar Hobbies .48-size F-86. The model is, in fact, a Paul's Flying Stuff .25-size F-86. We apologize for any inconvenience this may have caused.

Keep Life Simple.

One of the most recognizable planes in aviation history, the Vought F-4U Corsair was also one of the most effective weapons of the Pacific Theatre.

Ace R/C now brings this memorable warbird to life in a 1/2A sized replica as part of its popular Simple Series.

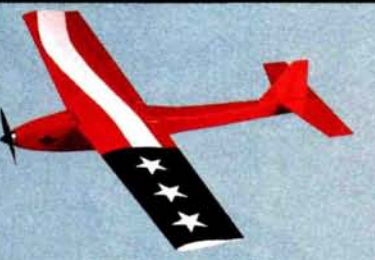
These planes feature crisp, clean, die-cut parts, injection-molded foam wings, and simple, quick construction techniques. And all for a price that will fit the tightest budget.

All that are required for completion are a 2 channel radio system, .049-.074 engine, prop, tank, fuel line, glue and covering film.

Simple Series

ACE4242 Simple Corsair
Wing Span: 36"
Engine: .049-.074 cu. in.
Radio: 2-4 Channel

ACE4243 Simple Cub
Wing Span: 35"
Engine: .049-.074 cu. in.
Radio: 2-4 Channel



ACE4244 Simple 400
Wing Span: 34"
Engine: .049-.074 cu. in.
Radio: 2-4 Channel

There are also two more additions to the Simple Series family; the Simple Cub, based on the most popular general aviation airplane of all time, and the Simple 400, which can be configured as a glider, as an electric, or a gas-powered plane. Both planes feature molded foam wings, crisp die-cut parts, and the same value that has always been part of the Ace R/C Simple Series.

Available again are the five members of the classic Simple Series, the AT-6, ME-109, P-51, Extra 230 and Ultimate biplane. Like their three new counterparts, these planes can all be completed in just a few hours of assembly.

ACE R/C

Keep Life Simple.

ACE4250 Simple AT-6
Wing Span: 35"
Engine: .049-.074 cu. in.
Radio: 2-4 Channel

ACE4249 Simple ME-109
Wing Span: 35"
Engine: .049-.074 cu. in.
Radio: 2-4 Channel

ACE4248 Simple P-51
Wing Span: 35"
Engine: .049-.074 cu. in.
Radio: 2-4 Channel

ACE4251 Simple Extra 230
Wing Span: 35"
Engine: .049-.074 cu. in.
Radio: 2-4 Channel

ACE50K245 Simple Ultimate
Wing Span: 33"
Engine: .10-.20 cu. in.
Radio: 4 Channel

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PILOT PROJECTS

A look at what our readers are doing

SEND IN YOUR SNAPSHOTS. ***Model Airplane News*** **is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable. We receive so many photographs that we are unable to return them.**

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of the year. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to: Pilot Projects, *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

LUIS'S BIG TOW

Luis Firmino Jr. of Cotia, Brazil, shows off his tribute to the squadrons of Desert Storm. The Tow Cobra is a .61-powered chopper built using a Century fuselage. Luis added more scale detail, including a movable machine gun and operational navigation lights.

VERTICAL IN VEGAS

This 1/5-scale Harmon Rocket II is the scratch-built pride of Las Vegas, NV, resident Joe LeRoy. The 10-pound, Webra 120-powered ship with an APC 15x10 is "a real hot-rod" that's extremely aerobatic with unlimited vertical performance. On landings, however, the plane is slow and very stable.

"NEW"PORT

Alan Yendle of Atlanta, GA, recently completed this beautiful, 20-pound, Nieuport 24*bis* from an English *D&B* kit. The 92-inch-span Solartex-covered bipe flies very well off grass, but Alan admits, "It can be a handful when on the tarmac." Power is supplied by a Saito 270 with onboard glow system; Alan created the scale engine cylinders with aerosol hairspray cans, aluminum tube and 3/16-inch plywood.

TEXAS TWIN

Ali Aghassibake used "Jane's" 3-views to scratch-build his "sort of scale" Shorts Skyvan. The 61-inch model is powered by a pair of O.S. .25FPs. The Irving, TX, modeler has installed a working cargo door as well as a removable nose section for steering access.

DREAM D-VII

Howard Munson writes that his father, Lennart Munson of Valparaiso, IN, spent 10 months scratch-building this Uravitch-designed, 1/5-scale Fokker D-VII. Lennart powers his dream model with a G-38 engine and an 18x8 Zinger propeller. The airplane is covered with 21st Century fabric and topped with fabric trim crosses by Die Hard Graphics. Lennart would like to thank Ed Rogala of Midwest Products for his help with the project.

MASS MARKETING

Dennis Penner of South Dennis, MA, proudly shows off the Douglas DC-3 that he made from *Model Airplane News* plans. The 75-inch-span aircraft was trimmed in the colors of the Hyannis-based passenger carrier, Island Airlines. Unfortunately, the full-size plane has been sold since this project began five years ago, but the model brings back many fond memories. The dual O.S. .25FPs rarely go above ½ throttle, so it is very quiet in the air. The only problem now, Dennis tells us, is finding more time to fly!

RENO RACER REPLICA

This sleek, 52-inch-span Stilletto is the work of Juan A. Valentin of Ramey, PR. The balsa-and-ply fuselage was glassed with K&B ¾-ounce cloth, then painted with K&B Superpoxy. Juan used MonoKote to cover the 6.2-pound racer's wings. He completed the Futaba 6XA-controlled machine with a "very fast" .45 Rossi, a Tru-Turn spinner, Hobbico retracts and vinyl lettering by Albert Designs.

FATHER AND SON FAN-ATICS

From Cali, Colombia, we have this *Model Airplane News* plans project. Néstor Londoño and his son Andres built this Skyburner outfitted with an O.S. .91 engine coupled to a Dynamax fan unit. The jet has become an established flier at their local grass field.

CAPTURED TIGER

Canadian modeler John Rossetti has faithfully rendered the detail of the DH82 Tiger Moth in his Clarke Industries model. The color scheme John used on the Quadra 42-powered machine is copied from a full-scale ship at the Guelph Air Park. The Bramalea, Ontario, hobbyist tells us his 22-pound, ¼-scale biplane is a beautiful flier.

NUTS FOR THE CHIPMUNK

Lucky and Sharon Mustard of North Las Vegas, NV, display their team effort: a Carl Goldberg Super Chipmunk. They retained the patriotic colors of the original full-scale aerobatics champion, but have employed a slightly different layout. Lucky made a top-wing aileron pushrod exit so the dry lakebed's dirt wouldn't harm the servos. Sharon handled the fine cockpit detailing, and photo credit goes to friend and fellow modeler Joe Owens.

HINTS & KINKS

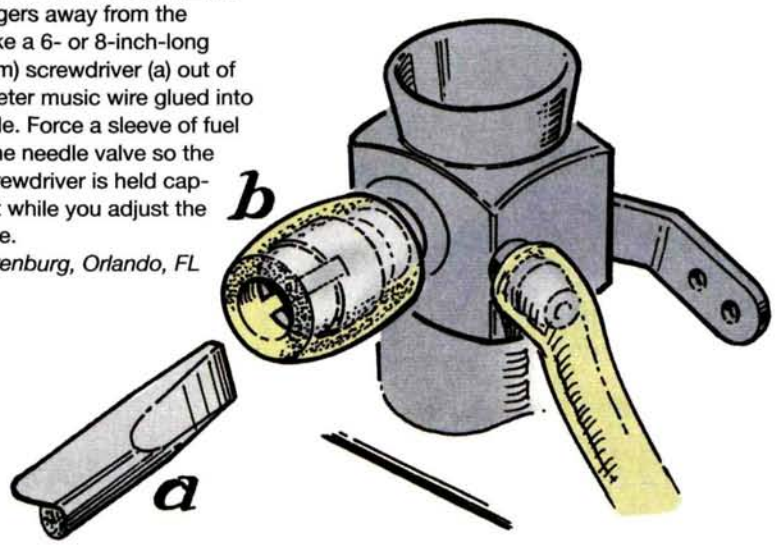
BY JIM NEWMAN

SEND IN YOUR IDEAS. Model Airplane News will give a free one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman c/o Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.

NON-SLIP ADJUSTER

Keep your fingers away from the propeller. Make a 6- or 8-inch-long (150 to 200mm) screwdriver (a) out of suitable diameter music wire glued into a dowel handle. Force a sleeve of fuel line (b) over the needle valve so the end of the screwdriver is held captive in the slot while you adjust the running engine.

Harold Marenburg, Orlando, FL



STAR STRUCK

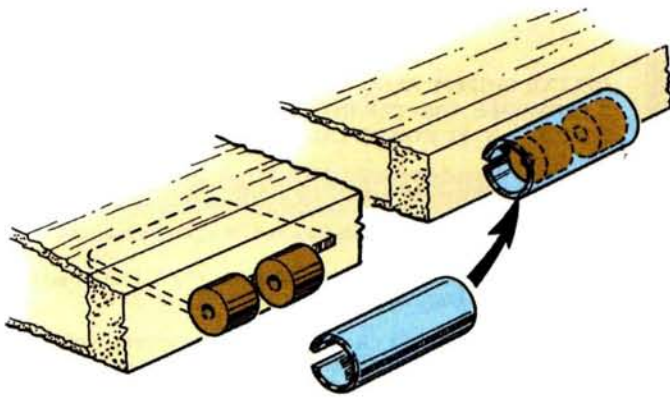
A light tap on top of this punch quickly pops this star washer over the stem of a pushrod connector. (The tube keeps the washer level as it is fitted.) Use 3/16-inch (5mm) rod soldered inside a matching tube, leaving space at the bottom of the tube to clear the stem.

Stew Pickford, Seattle, WA

WALK THIS WAY

Add realism with a walkway of 400- or 360-grit emery paper glued to the wing. Airplanes with canopies usually had a walkway on only the left side; cabin types with a door have one on the right side only; and open cockpit types often have one on each side.

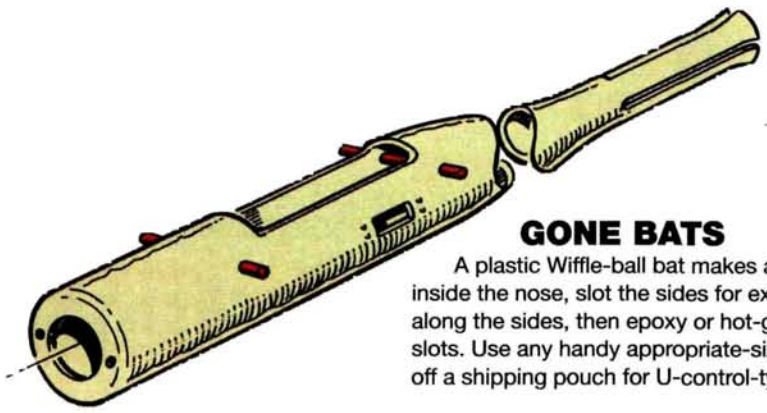
Keith Sessions, Louisville, KY



PAINT MASK

A split sleeve of Nyrod casing slid over the hinge knuckles will keep paint out of the hinges while you spray. When the paint is dry, remove the sleeves, attach the control surfaces and insert the hinge pins.

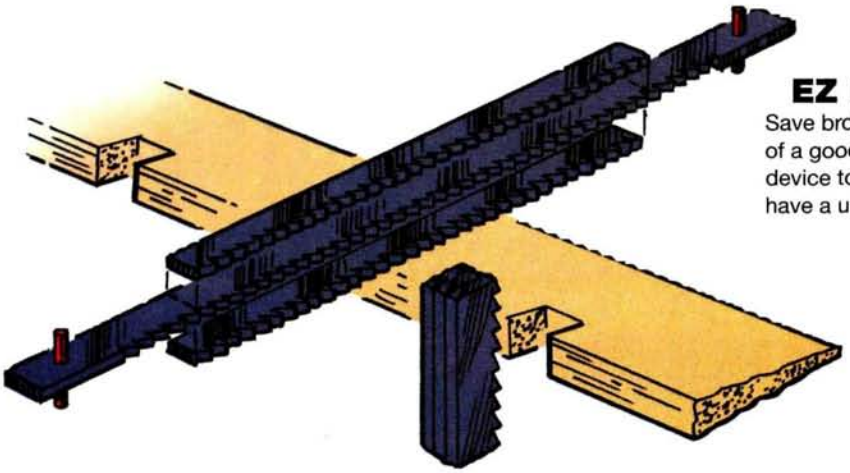
Jim Schweitzer, Hendersonville, NC



GONE BATS

A plastic Wiffle-ball bat makes a fine fuselage for electric R/C. Mount a 600-size motor inside the nose, slot the sides for external servo mounting, hot-glue small-diameter Nyrods along the sides, then epoxy or hot-glue balsa-edged, corrugated cardboard tail surfaces into the slots. Use any handy appropriate-size wing, or make one out of cardboard. Use Tyvek strips cut off a shipping pouch for U-control-type hinges.

Bill Lynch, Warrington, PA



EZ RIB SLOTTING

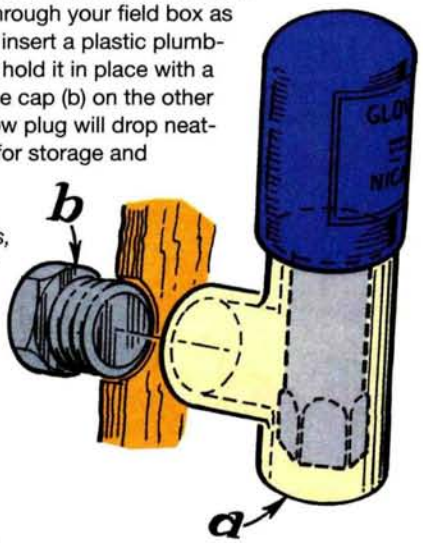
Save broken jigsaw blades! Glue the broken pieces to each side of a good saw blade, carefully aligning the teeth, then use this device to cut beautiful rib slots. Rig stop blocks so all slots will have a uniform depth.

David Kovensky, Albuquerque, NM

GLOW-PLUG HOLDER

Drill a hole through your field box as shown, then insert a plastic plumbing T (a) and hold it in place with a threaded pipe cap (b) on the other side. The glow plug will drop neatly into the T for storage and be instantly accessible.

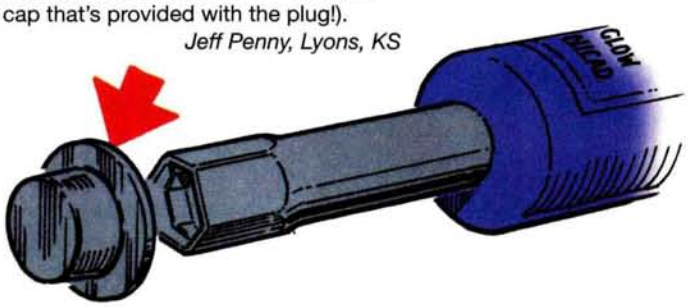
Gary Crooks, Overton, NV



RECYCLED CAP

Save the plastic cap that's inside some epoxy bottles. This cap fits nicely over the end of your glow plug (more easily than the standard molded cap that's provided with the plug!).

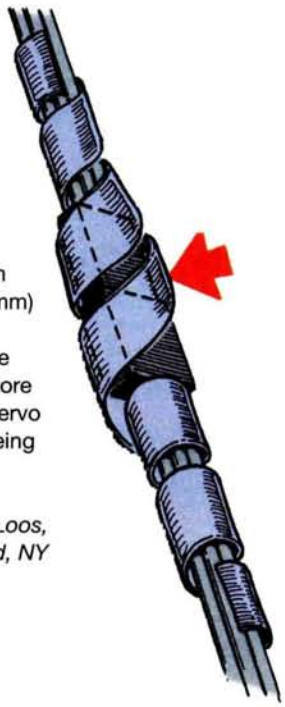
Jeff Penny, Lyons, KS



IN A SPIRAL

A short length of 1/8-inch (3mm) plastic Spiral Wrap from the electronics store will prevent servo plugs from being accidentally pulled apart.

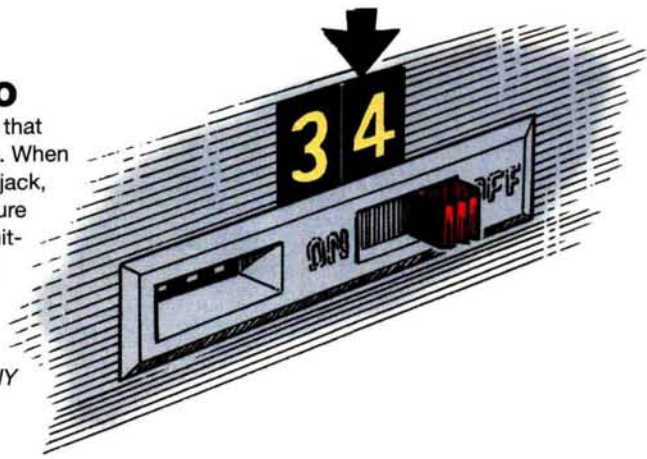
Henry Loos, Waterford, NY



CHANNEL MEMO

These numbers are stickers that come with blank VCR tapes. When applied above the charging jack, they will remind you to be sure you have the correct transmitter for the plane. Match the number on the plane with the number on the transmitter frequency flag.

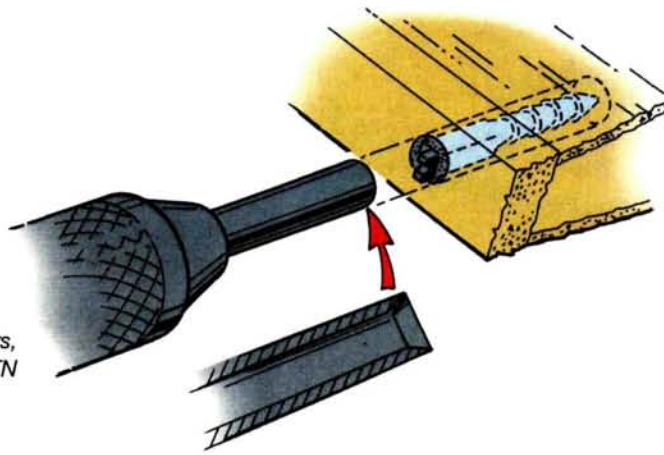
John Finkle, Pittsford, NY



HOLE SAW

A sharpened tube in a drill will cut neatly around a broken Du-Bro or Robart hinge. Fill the hole with a glued-in balsa plug, then redrill to fit a replacement hinge. Some builders like to file small teeth around the edge of the tube to make a mini hole saw.

Eugene Waters, Oak Ridge, TN



Florida JETS

by Rich Uravitch

The changing flavor of R/C jet modeling

Proving that a scale model can be a "sport" jet ... the BVM MiG-15 "demonstrator." Sport or not, it's still a 180mph+ airplane.

THIS WAS THE third year for Florida Jets—the second year that I've attended—and all I can say is: my, how the flavor of jets has changed! Many longtime readers of *Model Airplane News* will recall that this publication broke the ice on jet activity 16 years ago in the July 1983 issue by introducing the "Jet Blast" column, which I was privileged to author. Jets were new; all the propulsion was provided by ducted fans, and some exciting stuff was on the horizon. I frequently traveled to and reported on "fan" meets around the country and around the world. Much of the after-hours activity at these events consisted of "hangar flying," where we'd kick around ideas for new or improved airplanes, fuel systems, retracts, fans and other systems of the time that would inevitably mature and evolve as more fliers used them. Some of us even spoke quietly about miniature gas turbine engines. After all, the only thing that spoiled the illusion of our jet models then was the high-pitched, shrill tone from the piped engines as they unloaded to more than 23K coming downhill.

Well, manufacturers persevered, and with input from "the guys in the field" have brought fan propulsion systems to the point at which they're not likely to improve much; a little here on the reliability, a little there on the longevity but for the most part, we're there. Then how has the flavor of jets

Craig Gottschang's F-4E Phantom from the BVM kit. Its color scheme is from an Edwards AFB-based Rhino and is more interesting (and much more visible) than the more often seen camo.

PHOTOS BY RICH URAVITCH

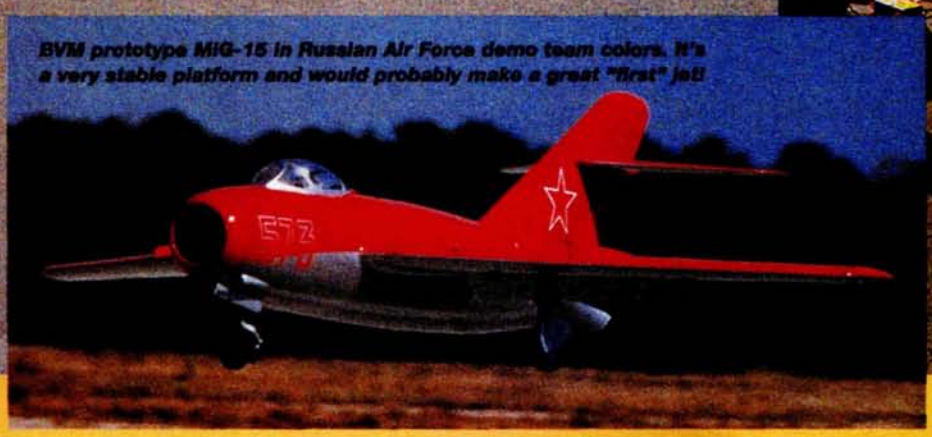
Above: Dave Malchione's BVM Phantom finished as a "J" model; near-perfect attitude for touchdown. Dave's 16-year-old son, David, shared the flying chores and did a terrific job!

Below: the Bandit owned by the always-innovative Bob Violett. This model features a full-flying vertical fin that, when deflected to this position, acts as a speed brake! No, no; just kidding. Actually, the fin is removable to permit easy transportation on the new BVM molded case.

changed? If you had been with me at Florida Jets, you'd know. What was once high-tech in ducted-fan systems is now routine. Instead of managing a few flights after tuning and adjusting all day, guys were stopping long enough to refuel and get airborne again. That familiar ducted-fan sound was there, overshadowed—but not drowned out—by the sound of the next-generation power system: those turbine packages we dreamt about and wished for years ago. I didn't do a physical count, but I'd guess that at least half the models flying were propelled by RAM*, JPX*, JetCat*, Sophia* and Golden West* turbines!

Right: Gustavo Campana of Argentina was surrounded by spectators interested in his Su-27 built from the Fiber Classic kit. RAM 750-powered, the big Flanker featured a functional speed brake and the same splinter camo finish that is used on the Russian aerobatic team's full-size Sukhois.

BVM prototype MiG-15 in Russian Air Force demo team colors. It's a very stable platform and would probably make a great "first" jet!



This MiG-15 from the BVM kit was built and flown by event organizer Frank Tiano. Its unique finish duplicates an example on display at the U.S. Air Force Museum at Wright-Patterson AFB in Dayton, OH.

INSPIRATIONAL PERFORMANCES

Go to an event like this, and it's hard not to come away inspired. There are always a few things that stand out as exceptional in performance, appearance, creativity or just plain talent; let me touch on a few. Photos of some will appear in this coverage; please take my word for the others. There were lots of good fliers on hand, some great aerobatics displays and speed runs by the sport jets like Vipers and Mavericks, but scale flying still captures my interest. For example, when you watch a guy like Rei Gonzalez reef a giant F-16 around and fly 9G 360s at 100 feet, you have got to be impressed. Same for Dave Malchione and his big, orange F-4 Phantom; the only thing missing when he touched down on the numbers in a perfect attitude were the blue/gray puffs of smoke from the tires! One guy who consistently does it right (and makes me downright jealous!) is Tom Cook, who set the ducted-fan world on fire some 15 years ago with a twin, ducted-fan F-4 with two K&B* 7.5s and Turbax* fans. His flights with the big T-33 he kits were outstanding—smooth and precise. His short finals were eye-watering and an absolute pleasure to watch!

Another pioneer, Bob Violett, demo'd nearly everything he kits, from the Maverick to his latest—the Dassault Rafale. This twin-turbine machine is impressive when it just sits there; the real appreciation comes when you see it fly. It has all the right things, aero-wise, in a single package: its delta planform, area rule fuselage and canards all pay off when this machine gets airborne. Jerry Caudle, proprietor of Pro-Mark Markings* and a good friend of Bob's, confided that the Rafale's test hop a few days before had seemed almost routine. Fire up the engines, taxi out, take off, trim it out, land it, taxi back, shut down ... ho-hum! I'd be just a little nervous if it were mine, as this package will set the well-heeled buyer back the price of a new Toyota (on sale). No ques-

The new Dassault Rafale from BVM. This is Bob's prototype, and it's nothing short of spectacular! Thirty-six pounds, a JR radio and a pair of RAM 750 turbines; it ain't cheap, but it sure is impressive!

Above: here's one of two A-10s that Dean Lassek brought all the way from Colorado. It's powered by a pair of O.S. 91s driving Dynamax fans. It weighs 48 pounds, is 6 years old and was built from the Josh Harel plan. Left: Dean Lassek pre-flighting the fan-powered T-Bolt II. Although this beauty is huge, it flies remarkably well in both fan- and turbine-powered form. Below: Rei Gonzalez flew this Gary Mueller-designed, RAM 750-powered F-16. The 32-pound model cruised around convincingly and performed some really impressive, in-close 360s. It's scheduled to be kitted by Top Gun Models.

Coming soon from Air Magic: this F-15 kit. Its attractive scheme is from JASDF and is a welcome change from the usual bland, gray/gray USAF birds; 28 pounds, RAM 750.

AWARD	RECIPIENT	MODEL	SPONSOR
Designer Achievement	Gary Mueller	Giant F-16	BVM
Engineering Excellence	Bob Violett	Dassault Rafale	ZAP Gang
Manufacturer Achievement	Air Magic	F-15 Eagle	Airtronics
Best Sport Jet Performance, D/F	Rob Lynch	BVM Bandit	BVM
Best Sport Jet Performance, Turbine	David Shulman	BVM Bandit	BVM
Best Military Performance, D/F	David Malchione	F-4 Phantom	RAM Turbines
Best Military Performance, Turbine	Tom Cook	JMP T-33	ZAP Gang
Best Military Jet, Pre-1960	Frank Tiano	MiG-15	Air Magic
Best Military Jet, Post-1960	Gustavo Campana	Su-27 Flanker	Zap Gang
Best Sport Jet	Felipe Vidal	BVM Bandit	Airtronics
Best Civilian Jet	Tim Davis	Airbus A-310	JR Radio
Best Multi-Engine Performance	Bob Violett	Dassault Rafale	JR Radio
Critic's Choice, D/F	David Malchione	F-4 Phantom	RAM Turbines
Critic's Choice, Turbine	Bob Violett	Dassault Rafale	Airtronics

tion that Bob Violett Models (BVM*) has captured the lion's share of the jet market; the guys who use his stuff are his best advertising. The line forms to the left for the Rafale!

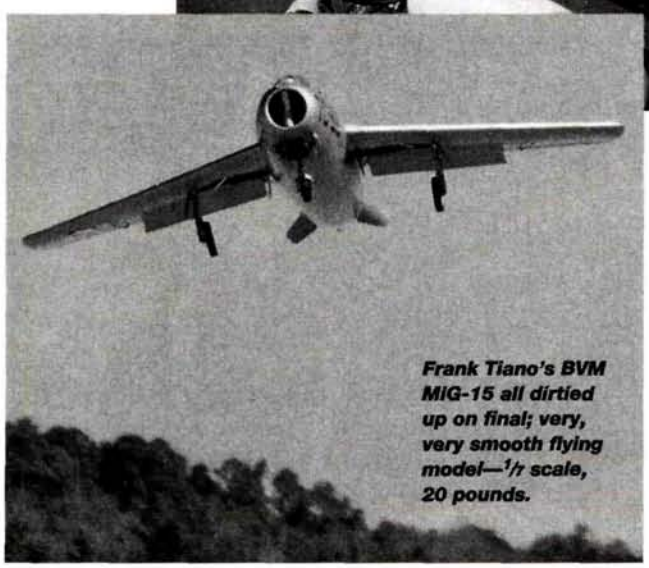
Young David Malchione was heard asking, in typical 16-year-old fashion, "Hey, Dad, can I borrow the F-4?" Dave Sr. replied, "Sure; just be careful with it and bring it home with some gas left in it!" Within minutes, the big, orange Phantom in NMC markings was barreling down the runway on another well-flown mission. This kid is good; sure hope he sticks with the sport. We need more like him.

"Big; impressive with moderate speed and lotsa 'in-close' maneuverability" best describes the pair of A-10As brought by Dean Lassek. One was twin-turbine-powered, while the other used a couple of Dynamax*/O.S.* .91 packages for motivation. Originally developed from Josh Harel plans, they now feature fiberglass fuselages and reworked construction. They appeared to be closely matched until both were airborne; then it was obvious that the turbine-powered T-Bolt—even with its gear down—had a clear speed advantage over the fan-driven version. But because speed isn't the A-10's greatest asset, the difference was of little significance.

EYE CANDY

Florida Jets attendees were also treated to a number of models that were appealing from a purely visual standpoint, either because of subject itself or the way it was executed. Among the standouts was Rich Fong's F-106 built from the Usher* kit. This is a not-often-seen subject that's both unusual and very impressive. Its overall size and delta planform look as good in model form as they do in full scale. Ditto for the A-7 Corsair II built by Ralph DiBiase from the ETA* kit. This and the Jet Hangar Hobbies* A-7 model of the SLUF are the only kits available for this really neat model, which is a near-perfect subject. Its moments, high-mounted wing and fairly conventional layout are ideal and translate well to model form. Perhaps even a more ideal subject is the BaE Hawk built from the Jim Fox kit (England) by Greg Arnette. This model was powered by the tried and true Ramtec*/O.S. .91 combination, which pushed this machine around at a brisk clip.

Event director Frank Tiano (standing) with his MiG-15 built from the BVM kit. It has a 68-inch span, is 68 inches long, uses a RAM 750 turbine and an Airtronics radio and is finished with PPG Deltron paint. Pat McCurry (left) and Shawn Curry (right) perform ground-crew duties on Frank's pretty MiG. Internal access to this model is obviously not a problem!



Frank Tiano's BVM MiG-15 all dirtied up on final; very, very smooth flying model—1/7 scale, 20 pounds.

Nice part about the design is that, with some minor cosmetics, it could be turned into the U.S. Navy's newest tutor, the T-45 Goshawk.

Some of the prettiest sport jets you could imagine were on hand. The finishes on some of these jets were absolutely flaw-

One of the prettiest BVM Bandits at the meet was this one by Felipe Vidal of Puerto Rico. The "Skyblazers" markings looked just perfect on it!

less, and the color schemes were exciting, dramatic, highly visible and, in some cases, literally works of art! PPG's* seemed to be the paint system of choice among these modelers; the brilliant lime green and checkerboard Maverick of Trae Miller was typical. David Shulman finished his Bandit in a desert scheme using the same materials as Frankie Mirades did on his Maverick. Some builders even chose to combine "scale-like" military schemes with sport jet airframes. A most outstanding example of this was Felipe Vidal's BVM Bandit in USAF demo team "Skyblazer" markings. This jet was the recipient of the Best Sport Jet award both here and at the Deland (FL) Jets meet earlier this year.

On a slightly more grandiose scale was Bruce Holicek's Aero L-39 Albatros. Boy, did this baby perform! Did I mention that it is 12-inch-to-the-foot scale?

TRENDS AND WHERE JETS MIGHT BE GOING

A number of things jumped out and hit me when I recapped the meet for this article. First, scale airplanes are getting larger. Dean Lassek's A-10s, Gary Mueller's F-16, Violett's Rafale and Campana's Su-27 offer clear evidence of this. It's easy to understand why: bigger models fly better and, because reliable power is now available, modelers aren't forced to do as much "shoe horning" to integrate the propulsion system with the airframe. More and more "off-the-shelf" component availability is making a greater number of jet subjects "model-able." Given the fact that the jet guys are among the most creative in the R/C hobby, it stands to reason that we are seeing—and will continue to see—some really exciting stuff.

There seemed to be as many ducted-fan as turbine-powered models. It also seemed as though the turbine models were airborne a lot more! Maybe it was because the sound of the engines grabbed your attention more quickly than the turbines; maybe because we now consider turbine operation to be "routine." Whatever the reason, it seems that jet modeling may be dividing along propulsion lines. I even talked to a few guys whose only jet experience came from turbines; they hadn't started with ducted fans at all! I guess that points up the relative simplicity of using a turbine; and that may bring about its own set of concerns ....

SIMPLE SANS SAFETY?

Walking through the vendors' display area left me amazed at just how far this segment of the hobby has come in a remarkably short time. Manufacturers provided all kinds of information and performed really impressive demos. With turbine operation, you can forget about all that needle-valve adjustment, tuned-pipe length, glow fuel and such; now just hook up a few quick-disconnect lines for fuel and ignition, hit the start button, and everything happens automatically through the miracle of computer chippery! I mean it: it's that simple! Too simple, in my opinion; it seems to ignore at least some of the potential hazards associated with safe turbine operation. I'm not certain what the requirements are—if any—for owning or operating a turbine, but I think we must recognize that, as easy as the manufacturers have made them to operate, each user bears a certain responsibility for the safe operation of these engines. Enough about that; as the expression goes, "Let's be careful out there!"

Where does jet modeling go from here? Good question. I have every confidence that we'll see turbine prices decrease, ease of operation increase, airframes become larger, the variety of available kits expand and, hopefully, more modelers become involved. From a technical standpoint, we'll likely see more auto-start systems, even more availability of prefabricated, composite airframes, and equipment upgrades until what we're flying really becomes RPVs and UAVs. Pretty amazing stuff, in fewer than 20 years, from a small group of guys who decided to "make it happen." Boy, do we owe them—big time!

AND A WORD FROM OUR SPONSORS AND ORGANIZERS

Lest you think that events like this happen automatically, let me give you the scoop. The key to any successful event is promotion and sponsor involvement. Someone has to provide the prizes, awards, facilities, staffing and everything else from which we, the participants, benefit. Florida Jets was top drawer all the way with the lion's share of the sponsorship coming from the Zap Gang, BVM, RAM Turbines, Airtronics, Du-Bro and R/C Jets International. The facility was first class, and contest administration was outstanding. Participants I spoke with thought it was just great to be at an event like this and to have no concerns other than flying and enjoying themselves. Frank Tiano has been a friend of mine for many years, and he has proven himself quite adept at organizing and making events like this work. He enjoys it and has honed his skills on another event you may have heard of: Top Gun. You guys who have put together events for your club know what it takes; the effort is infrequently recognized, rarely appreciated, and almost never applauded. That's why I thought I'd take this opportunity to do just that.

Was Florida Jets worth attending? Non-modeling spectators I asked couldn't believe what they were seeing. Imagine: real model jet airplanes! Participants lauded the great site, lots of flying time, the great group of guys and the great chicken sandwiches ... I did say "the flavor of jets has changed," didn't I? Used to be chili dogs!

[Editor's note: if you're looking for a warm place to go at the end of February and would like to see some inspiring model jets, call FTE for information on next year's Florida Jets. The site is the Flagler County airport, about 10 minutes west of Interstate 95 in Bunnell, FL. That puts it about 20 minutes away from another crowd-pleasing attraction: the Daytona International Speedway.]*

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.*

While various designs, such as those shown on this page, may call for the same displacement engine, each requires a specific prop to perform at its best.

Airframes and prop selection

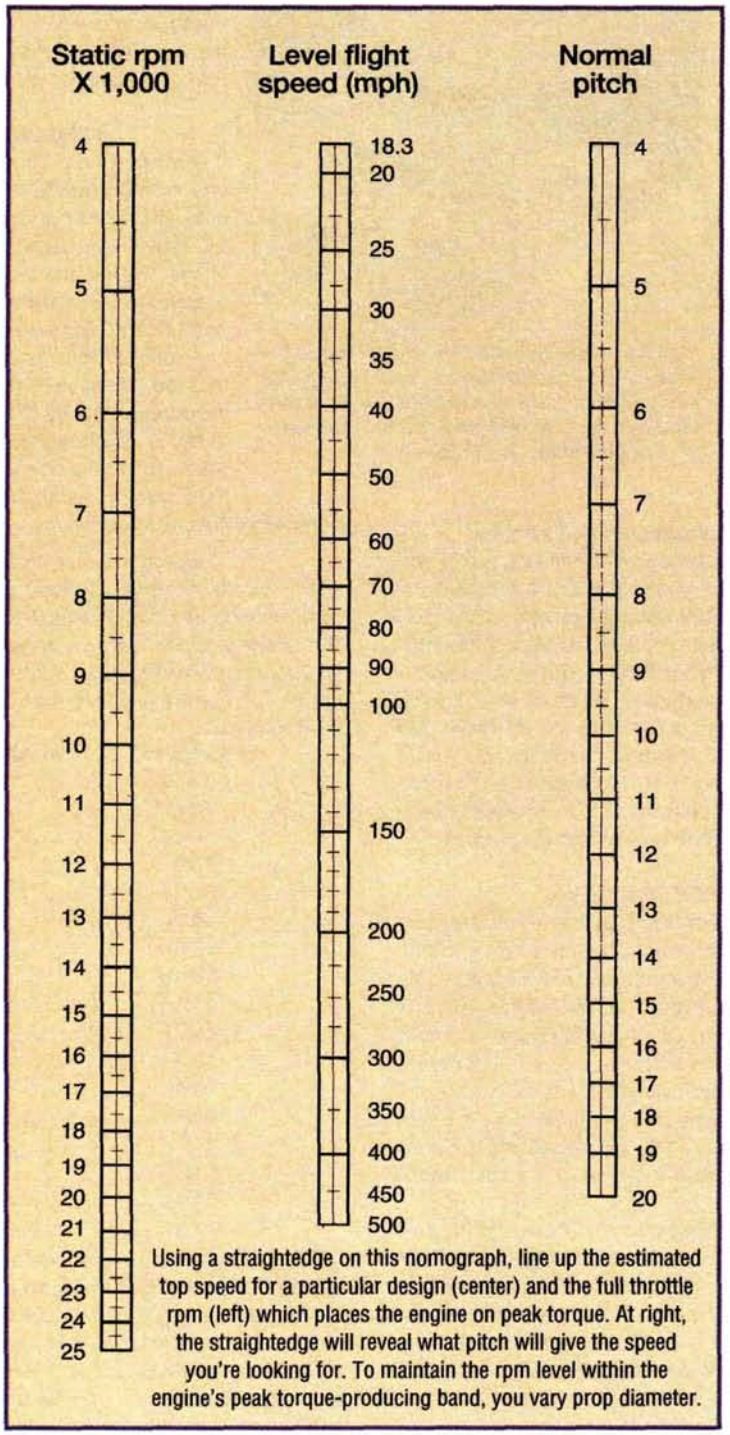
by Chris Chianelli with Dave Gierke

IN THE MAY ISSUE, I spoke about why peak horsepower figures alone were all but meaningless to us modelers, and why horsepower readings were only meaningful when taken at rpm levels where peak torque was being developed. The column provoked much interest and, to my delight, upbeat comment. I would like to take this opportunity to thank my main mentor: Dave "Dr. Dyno" Gierke. He supplied me with the Enya .60X dynamometer curve I used in the May "Air Power" and further consulted with me on the article. When I go out on a limb, it's thanks to guys like Dave, Andy Lennon, Mike Billinton and Clarence Lee that I've managed to keep my you-know-what out of a "technical sling" over the years.

The topic of propping an airframe, and not the engine, is so important—and so often misunderstood—that this month we thought the approaches of both Dave and me (his technical, mine practical) would be most beneficial.

So often, I'm asked a question to which, without more information, I'm unable to give a meaningful answer. That question is, "Chris, which prop should I run on my .25, .45 or .60-size brand-X engine?" The question that *should* be asked is, "Which prop is appropriate for my model's airframe?" This is why engine manufacturers often recommend a range of props of varying diameters and pitches in the instructions for a specific displacement engine in their lines.

Let's take, for example, a strong, twin ball-bearing sport .45 and consider it on three vastly different airframes with broadly disparate wing areas, wing loadings and drag factors. Let's look first at a very dirty, high-drag Fokker triplane with 750 square inches of



Using a straightedge on this nomograph, line up the estimated top speed for a particular design (center) and the full throttle rpm (left) which places the engine on peak torque. At right, the straightedge will reveal what pitch will give the speed you're looking for. To maintain the rpm level within the engine's peak torque-producing band, you vary prop diameter.

wing area; then a super-clean, low-drag Ultra Sport with retracts and 550 square inches of wing area; and falling in between these two, a medium-drag Spacewalker with 650 square inches of wing area. To keep things simple, let's assume each weighs in at 5.5 pounds (88 ounces, for a total weight of 100 ounces when the approximate 12 ounces of a sport .45-size engine is added). This gives each airframe a power loading (power-to-weight ratio) of 222 ounces per cubic inch. The preceding is one of the factors designers consider when determining the correct engine displacement for a certain model to ensure it will be adequately powered. But this still tells us nothing about which prop will make best use of the engine's power when considering a specific airframe's unique drag and lift characteristics.

Since we are unable to devote half of the magazine to this article, there's one thing that, for now, you're just going to have to accept on trust: ideally, a generic prop with a given pitch, rotating at a given rpm, will attempt to achieve a specific airspeed (in level flight) at which the engine/prop combination will be operating at peak efficiency. This efficiency will be realized if, and only if, the airframe it is matched up with will allow it to do so.

To illustrate the point, let's suppose we have a 10x9 prop turning at 12,000rpm on our sport .45 engine. Using the nomograph pictured here from page 89 (figure 15) of Andy Lennon's "R/C Model Aircraft Design," the estimated speed this pitch/rpm combination would produce is approximately 125mph; that is, if the airframe in question and its inherent drag will allow.

Now let's move this spinning prop to the nose of the Fokker triplane. Obviously, with the drag presented by a .45-size model with three wings, a round cowl, fixed landing gear and cabane and interplane struts, it's never going to fly anywhere near 125mph. If you attempt to force the issue in a power-on dive, dangerous control surface flutter would surely result. If, by wizardry, the Fokker's engine displacement was magically doubled in the middle of this already daunting power-dive, the poor little triplane just might self-destruct in a mass of airborne confetti faster than you can say "VNE" (velocity never exceed).

The inherent drag of the Fokker will not permit it to reach sufficient speed, thereby not permitting the engine to unload to sufficiently high rpm levels that would put it in its optimum torque band range. Simply stated, the engine is too "loaded" under these conditions.

Conversely, let's assume the Fokker's airframe allows a top speed of only 60mph. Again, if we used Andy's chart, we'd find that in the ballpark of 12,000rpm, a 4-inch pitch would match this speed nicely. Since the pitch has now been drastically decreased, we must now manipulate the diameter to keep the engine turning in the 12,000rpm range. Moving from the original 10-inch diameter to a 12-inch diameter will probably do nicely. If the 12-inch diameter happens to reduce the rpm level to 11,500, for argument's sake, this would bring the speed to about 55mph which would still be correct for a .40-size model of this type. At the very least, a 12x4 prop would be an excellent starting point for the Fokker. Using the 10x9 prop, or anything close to it would be, in a sense, kind of like driving uphill in a pickup truck loaded with firewood in fourth gear.

The other side of the picture, of course, would be to put the .45 engine/10x9 prop combination on a clean design like a .40- to .45-size Ultra Sport. With retracts, this airframe would have no problem whatsoever attaining 130mph. This would allow the engine to go ahead and unload at 12,000rpm. So a 10x9, or possibly an 11x8 would be a good match. In terms of lift, drag and top speed, the Spacewalker would fall somewhere in between the Ultra Sport and Fokker, making an 11x6 prop a good starting point for this design. At 12,000rpm, the 11x6 would be looking in the neighborhood of 80mph—a very comfortable neighborhood for a Spacewalker.

These are some practical examples that make use of Andy's ingenious nomograph, with some empirical thought added to the mix regarding the overall "dragginess" of your R/C airplane. If you'd like a little more technical insight to nail your prop selection dead-on, Dave's piece gives an easy-to-use arithmetic tool you'll find very useful during testing at the field. You'll truly be an expert, not just sound like one—like that guy in every club who wears a windsock beanie and mirrored sunglasses, walks the flightline and bestows advice, but never flies.

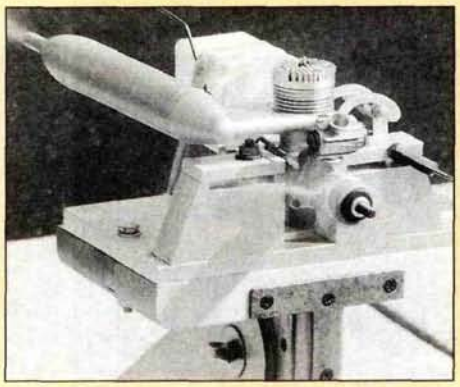
Continued on next page

THE LOAD FACTOR FORMULA

by Dave Gierke

You're at the flying field trimming out a shiny new sport model when one of your more experienced flying buddies asks, "Are you at full throttle? The engine doesn't sound like it's turning fast enough. I think you're using too much prop ... maybe you should try one that doesn't load the engine as much."

Too much prop? Loading the engine too much? To many modelers, these terms are meaningless—something for the experts to fuss about. After all, engines are engines, right? Fasten a prop to the shaft, fuel it, fire it up and fly. What could be simpler?



It requires considerable tinkering to find the best compromise between engine, propeller and airplane. Here, a new K&B .40 ABC runs on the test stand with an APC 10x6 propeller (PLF 600) turning 14,500rpm.

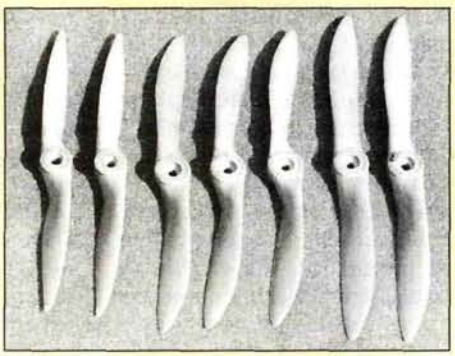
Why is it important to match the propeller to the engine? If you read the instructions that accompany your engine, the manufacturer probably recommends a size, right? In many cases, this prop will put you in the ballpark for a trainer-type model. But what happens if your model is somewhat different from the hypothetical trainer? What if it's a biplane? It may be heavier, generate more air drag and fly slower, or it might require a propeller with more diameter and less pitch. A lightweight monoplane with a relatively thin wing, streamlined fuselage, wing fairings and a low-drag cowl will probably produce less drag, fly faster and demand a prop with less diameter and more pitch. How do you determine which prop to use?

WHICH PROP SHOULD I USE?

For a given engine displacement and horsepower, there are propellers that are either too big or too small to function properly. Some foul up the engine's operation; others are inadequate to fly the model; some are guilty of both. If the propeller is too large, it has too much diameter and/or pitch. Changes in diameter affect engine load the most. Oversize props force the engine to operate too slowly, and this limits the horsepower needed to fly the airplane and invites overheating—especially with 2-stroke cycle engines. Experience has shown that most 2-stroke engines abhor being operated below 10,000rpm at wide-open throttle without special modifications.

Engines outfitted with props that have excessive pitch and marginal low-speed thrust production may not be able to achieve minimum takeoff speed: they run out of runway! After taking off into the wind, propellers with insufficient pitch may not maintain the minimum flight speed required to avoid the dreaded stall spin. In general, undersize propellers allow over-speeding, increase fuel consumption and reduce engine longevity.

Most fliers learn about propeller requirements by trial and error or copy what their buddies are using, and sometimes, that's a good idea, especially with a new airplane. But after the bugs have been worked out, many desire improved performance: better climbing ability (vertical performance?), top speed, or takeoff acceleration. Sorry! Unless you increase the engine's horsepower, you probably can't realize these attributes simultaneously. Without changing the power, propeller selection becomes a compromise. A shorter ground run prior to takeoff is accomplished with a lower-pitch prop, resulting in improved acceleration ... at the expense of reduced top speed. Top speed can be improved dramatically with a higher-pitch prop at the expense of a much longer takeoff run and reduced vertical performance. Most sport fliers prefer a performance smorgasbord: a little of each, thank you!



A family of propellers (APC) to be flown with a given engine/airplane combination. These have PLF numbers ranging from 363 to 605.

UNDERSTAND THE NUMBERS

If you like to experiment, the following technique allows you to manipulate flight performance incrementally—not wildly, or from one extreme to another. This strategy allows you to change (or modify) the propeller in terms of its diameter, pitch, or both, while maintaining or selectively changing the load on the engine. Sounds complicated but you'll find it really isn't.

Propeller load and engine rpm are inversely related: as load increases, rpm decrease and vice-versa. Load is represented by the propeller; change propeller size, and load is changed. By using the propeller load factor (PLF) formula, Lprop = D2(P), incremental propeller load changes can be determined and applied to the engine/model combination.

• Lprop = PLF. • D = diameter. • P = pitch.

For example, if the sport model at the beginning of this article was fitted with a 10x8 propeller, PLF would be 800 (10x10x8 = 800). Because propeller rpm increase as PLF decreases, we need to find a prop with a number that's less than 800. I have compiled a list of APC sport propellers and calculated their PLF to illustrate the technique:

Linear sizes	Rearranged by load	PLF
9x6	11x3	363
9x7	10x4	400
9x8	11x4	484
9x9	9x6	486
9x10	10x5	500
10x4	9x7	567
10x5	10x6	600
10x6	11x5	605
10x7	9x8	648
10x8	10x7	700
10x9	11x6	726
11x3	9x9	729
11x4	10x8	800
11x5	9x10	810
11x6	11x7	847
11x7	10x9	900
11x8	11x8	968

From the list, the next smallest PLF is 729 and is represented by the 9x9 propeller. This prop allows engine rpm to increase and would generate higher top speed at the expense of a longer, slower takeoff run. Climb performance would probably also suffer. The 11x6 propeller with a similar PLF (726) offers almost the same load as the 9x9 but provides better takeoff and climb performance while sacrificing some top speed. Another possibility would be the 10x7 (PLF 700). It allows the engine to speed up a bit more than the 9x9 and 11x6 while allowing an in-between top speed and takeoff potential.

Notice that I haven't included propellers from a variety of manufacturers on the PLF list. Because blade shape, area, airfoils and pitch generation all have an effect on load, you should limit PLF to families of propellers from specific manufacturers.

Although the PLF system doesn't provide an initial propeller size for your engine/model combination, it points you in the right direction based on your observations of engine rpm, takeoff distance, climb rate and flight speed (among others). You and your friends can now make objective evaluations of a model's performance based on how the engine and propeller are functioning. There may not be agreement, but now you have a tool that tells you where you are and in which direction you should head.

MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

Hobbico
EXTRA 300S
Steal the show with this aerobatic ARF

by Tony Newsom

I SOMETIMES THINK of myself as a 60:40 builder because 60 percent of my planes are almost-ready-to-fly kits. ARFs are hard to beat because they are well-constructed and an excellent value for the money. The Hobbico* Extra 300S is well made and has a nice covering job that I wouldn't easily be able to duplicate. The 36-page instruction booklet is loaded with photos, and I was able to complete the project in four or five evenings. This kit is certainly one of the best ARFs I've owned so far.

WHAT'S IN THE BOX?

When you open the large box, you'll find a plane that is about 90-percent built. All the major components are protected in individual plastic bags. The hardware includes the wheels, spinner, fuel tank, motor mount, nylon control horns, hinges, clevises and nuts and bolts. You will need a radio, engine, propeller and some other parts that are listed in the instructions. The plane is constructed of plywood, balsa, and foam, so it's easy to repair down the road. The quality of the wood (where I could see it!) looked excellent. The model is constructed in the same way I would have built it from scratch, and it's a step ahead of the "plastic-skinned" ARFs on the market.

There were quite a few bubbles in the covering on the wing. The instructions say to use medium CA to attach the covering, but this is difficult when the bubble is in

PHOTOS BY TONY NEWSOM & LEONARD ROSE

the middle of the wing! I contacted Hobbico, and they sent a replacement kit. The covering was much better on the second plane.

WING ASSEMBLY

The balsa-sheeted foam-core wing is assembled upside-down on a flat surface. I used a pencil to poke small indentations in the foam at the root end and 30-minute epoxy to join the wing halves. I was a little concerned because the wing didn't appear to have a wing joiner or spar. I installed the plywood wing servo box and the front and rear plywood wing formers. By the time I had installed the wing-mounting dowels, my concerns about the spar started to fade. I wrapped the center section of the wing with epoxy and the supplied fiberglass cloth, then glued the plastic belly pan onto the bottom of the wing. It turned out to be a very sturdy wing after all. The instructions outline the use of one or two servos for ailerons. I always use two aileron servos in my planes because it adds a margin of safety.

FUSELAGE AND TAIL FEATHERS

The fuselage is nearly complete out of the box. I installed the blind nuts into the rear wing mount and glued it into place after I tweaked it a bit to get the proper fit. I installed the motor mount, throttle pushrod tube and fuel tank and test-mounted the motor. After making sure I knew the difference between the top and the bottom of the stab, I used 30-minute epoxy to glue it into position. The formed-aluminum landing gear is attached to the fuselage with two, 8-32 screws threaded

SPECIFICATIONS

Manufacturer: Hobbico

Model name: Extra 300S

Type: sport-scale ARF

Wingspan: 58.25 in.

Airfoil: symmetrical

Wing area: 590 sq. in.

Wing loading: 27.3 oz./sq. ft.

Flying weight: 7 lb. (review model)

Length: 49 in.

Engine rec'd: .61 to .75 2-stroke or .91 4-stroke

Engine used: Thunder Tiger Pro .61

Propeller used: APC 12x8

Radio req'd: 4-channel (throttle, rudder, elevator, aileron) with 4 or 5 servos

List price: $179.99

Features: 90-percent built, all-wood construction, colorful covering, most hardware included.

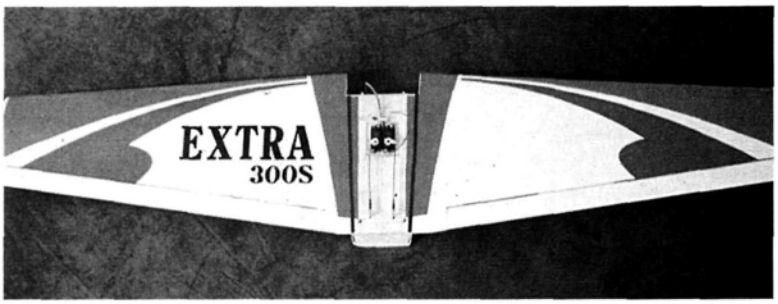
Comments: the Extra 300S is better suited to the pilot who has built a few kits and has some experience flying fast, responsive aircraft. I really enjoy flying this bird, and it has become one of my all-time favorites.

Hits

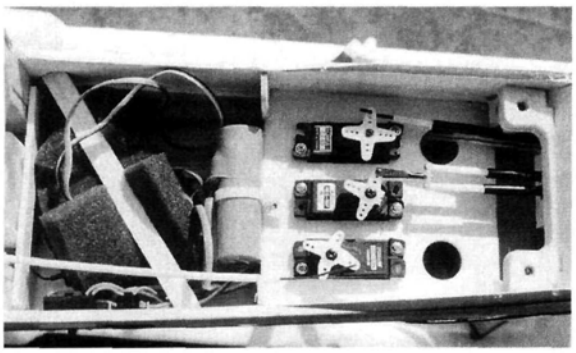
- Excellent value.
- Gets you flying quickly.
- Excellent flight performance.
- Good instructions.

Misses

- Weak landing gear and axles.
- Bubbles in covering.
- Faint score lines on plastic parts.



The instructions outline the use of one or two servos for ailerons. I always use two aileron servos in my planes for safety.



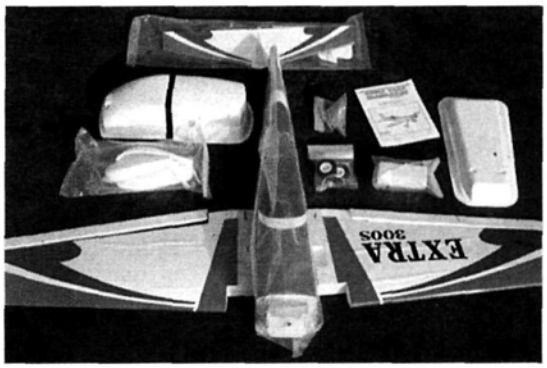
There is plenty of room in the fuselage and wing for standard-size servos, battery pack and receiver.

into blind nuts. I noticed that the gear seemed a little lightweight, and my first landing confirmed my suspicion. The aluminum bent rather easily, as did one of the axles. I went to the hardware store and bought a 1x24-inch piece of aluminum. It is 1/8-inch thick, which is a slightly heavier gauge than the aluminum in the kit. I cut the piece down to 19 inches and formed new gear. I also replaced the axles, which are about the size of 5-40 bolts, with 5/32-inch material. This modification made the landing gear much better and cost me only about $3! I glued the vertical fin and rudder into place and then attached the tailwheel assembly.

PLASTIC PARTS AND RADIO INSTALLATION

The cowl, wheel pants and belly pan are formed white plastic. The canopy is clear. The score lines (cut lines) on all of these parts were very difficult to see, so I had to guess where to cut these parts for a proper fit. To be safe, I first cut everything too big and then cut the pieces again after I had trial-fit them. I painted the top and nose of the cowl red and the upper third of the wheel pants blue.

There is plenty of room in the fuselage and wing for standard-size servos, battery pack and receiver. The servos are connected to the flying surfaces with nylon inner and outer rods. The instructions do not show these rods anchored at the servo end but do indicate that you should glue them at the rear of the fuselage. After connecting the pushrods from servo to surface, I found that the elevator and rudder could be moved by hand with only a little pressure applied. The controls were sloppy because the pushrods on the servo end flexed from side to side. I made some plywood looms and glued them into place around the rods near the servo end, and this prevented the rods from flexing and eliminated the slop at the surfaces. I used the supplied horns, hinges, etc. and attached them as shown. I used the recommended high-rate settings for control surface throws.



All the major components are protected in individual plastic bags. It doesn't take much work to get this model into the air!

The booklet says the CG is located 2 1/8 inches from the front of the wing fairing. I found myself thumbing back through the instructions to make sure I knew what the wing fairing was! A photo of the wing and fuselage with the CG symbol shown in position would have left little doubt.

FINAL THOUGHTS

Other than the few modifications I had to make to the landing gear, I think the Extra 300S is a well-made ARF that goes together quickly and looks very good when completed. A novice could assemble this kit, but it is not a beginner's airplane. The Extra 300S is better suited to the pilot who has built a few kits and has some experience flying fast, responsive aircraft. I'm pretty certain that you can't build this plane from scratch for $179.99! I really enjoy flying this bird, and it has become one of my all-time favorites.

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.*

FLIGHT PERFORMANCE

• TAKEOFF AND LANDING

I like to take off nice and easy with tail-draggers. I lined up with the centerline of the runway and slowly advanced the throttle. The plane gradually picked up speed and gently moved to the left as the tail came up. I added a few clicks of right rudder, and when it reached flying speed, I added a small amount of elevator. The plane lifted smoothly off the runway. I made a first turn, leveled the wings, and it was "hands-off" straight and level. No trim required!

On the first landing, I found that this plane keeps its speed, so you need to cut the power early in the approach to get the plane slowed down. The glide is predictable, and you use the large elevator to control your descent right down to the runway. My first landing was pretty soft but the plane did bounce once; this was enough to bend the landing gear and axle.

• HIGH-SPEED PERFORMANCE

With the Thunder Tiger Pro .61 and APC 12x8 prop setup, this plane really moves! It flies vertically as long as I point it up. I find myself flying at about 1/2 throttle most of the time, and that's good for 60 to 70mph. Push the stick forward, and you're well into the 80mph range. The plane flies straight and level throughout the throttle range and goes where the nose is pointed. At high speed, it's very responsive to small movements on the transmitter sticks.

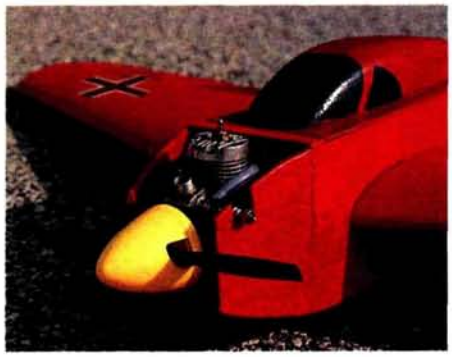
• LOW-SPEED PERFORMANCE

The Extra flies very well at lower speeds. I have not seen any extreme stall characteristics. The elevator allows you to control the plane even at the slower speeds, and the ailerons remain responsive. I tested the slow-speed handling at a safe altitude, and there were no surprises.

• AEROBATICS

My first snap roll with the Extra was a real eye-opener. It was quick! The large rudder makes knife-edge flight pretty easy. The roll rate is fast with the recommended throws, so if you don't like a plane that really reacts, cut this throw down some. I performed inside and outside loops that were straight without any rollout. Inverted flight is very good requiring very little or no elevator. I don't consider myself much of an aerobatics pilot but feel confident that the Extra 300S is capable of doing anything the pilot tells it to do.

by Mike Leasure

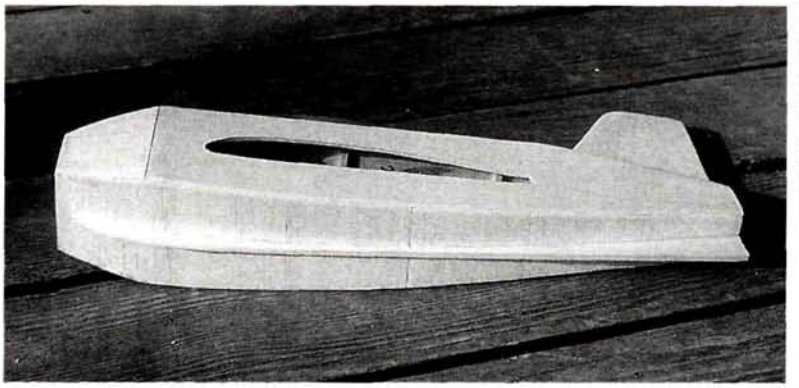


A 1/12-scale, foam-wing Messerschmitt

KOMBAT KOMET

PHOTOS BY MIKE LEASURE

THE GERMAN ME 163 KOMET was a rocket-powered interceptor that saw service in the waning days of WW II. The aircraft's simple construction and diminutive size, as well as its level of technical sophistication, were indicative of the conditions in the Reich toward the end of the War. With destroyed factories, fuel shortages and a lack of raw materials, the Me 163 was the desperate effort of a dying empire. The aircraft propelled itself from German airfields under rocket power to meet the invading Allied aircraft at high altitude. The rocket's duration was short; this necessitated a dramatic climb to altitude followed by a glide back to earth. Wheels were used for takeoffs only, and landings were made on its skid.



The fuselage has six major parts and is easy to build. Note the skid, which reduces damage on landing.

SPECIFICATIONS

Model name: Kombat Komet

Type: 1/12-scale combat (sport-scale Me 163)

Designer: Mike Leasure

Wingspan: 32 in.

Length: 20 in.

Engine req'd: .10 to .20

Construction: balsa, ply and foam

Features: this inexpensive, easy-to-build design is great for combat and sport-scale flying.

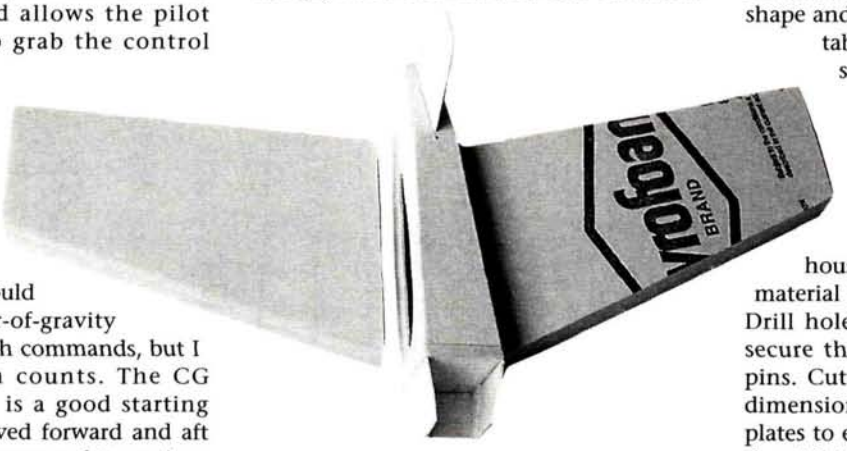
BEHIND THE DESIGN

I became involved in 1/12-scale combat last summer. When you first start to compete in combat, your model is primarily a target, so I figured that the cheaper and easier the aircraft was to construct, the less costly my training period would be. The 163 appeared to have all the attributes of a good fighter: maneuverability, speed, simplicity and a mid-wing with scale landing skid that would minimize damage during landings. The model can be launched overhand, which minimizes takeoff mishaps and allows the pilot precious seconds to grab the control sticks. The model is stable in flight but responds well to control. Its roll rate is fantastic, and pitch authority is ample. I had thought that a design such as this would be sensitive to center-of-gravity (CG) changes and pitch commands, but I was wrong on both counts. The CG shown on the plans is a good starting point and can be moved forward and aft (within reason) to accommodate various flying styles. The control throws are also a starting point. I have found that this design can handle all of the control travel available and still not display any bad handling traits. Many designs must limit elevator authority to prevent snap rolls at full deflection, but I have not experienced that problem with the 163.

I flew the prototype with an O.S.* .10 and although it performed well, when it hauled a 30-foot streamer, it was reduced to a target drone. Next came an O.S. .20-powered version that was a real rocket (pun intended). It was highly competitive with MVVS*-powered machines in speed but needed a 500mAh battery pack in the tail for proper balance. I believe the ideal engine for it is a hot .15 with a 270mAh battery in the tail (for balance). The .20 was fast, but the weight reduced maneuverability. Funny thing: with the .20, it could climb straight up to the combat zone and then make diving passes into the fray—much like the tactics of the full-size 163.

FUSELAGE CONSTRUCTION

With six major pieces, the fuselage is a quick and easy build. First glue the 1/4-inch-square longerons to the top and bottom of the 3/16-inch balsa sides. Then glue the plywood firewall and rear bulkhead into place as shown on the plans. Score the fuselage sides just forward of the firewall, and slightly bend them toward each other; this will streamline the design. Now add the lower braces to the engine compartment. Apply the 1/16-inch sheeting to the bottom and top of the fuselage with the grain running from side to side, then attach the vertical stabilizer and the bottom skid. Cut the hatch to shape, and shape and attach the foam canopy. I use a tab at the front of the hatch and a screw at the rear.

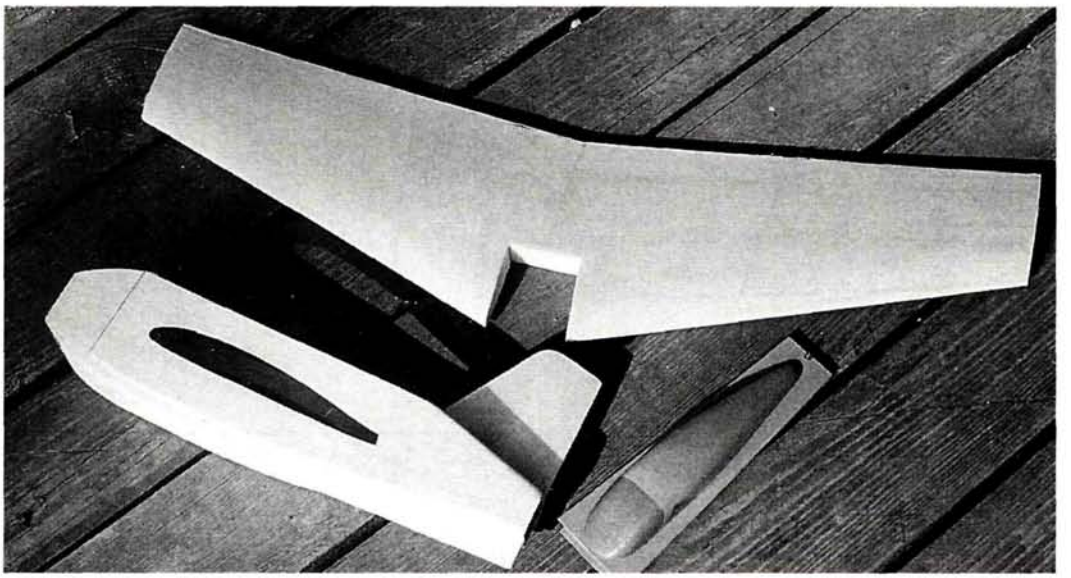


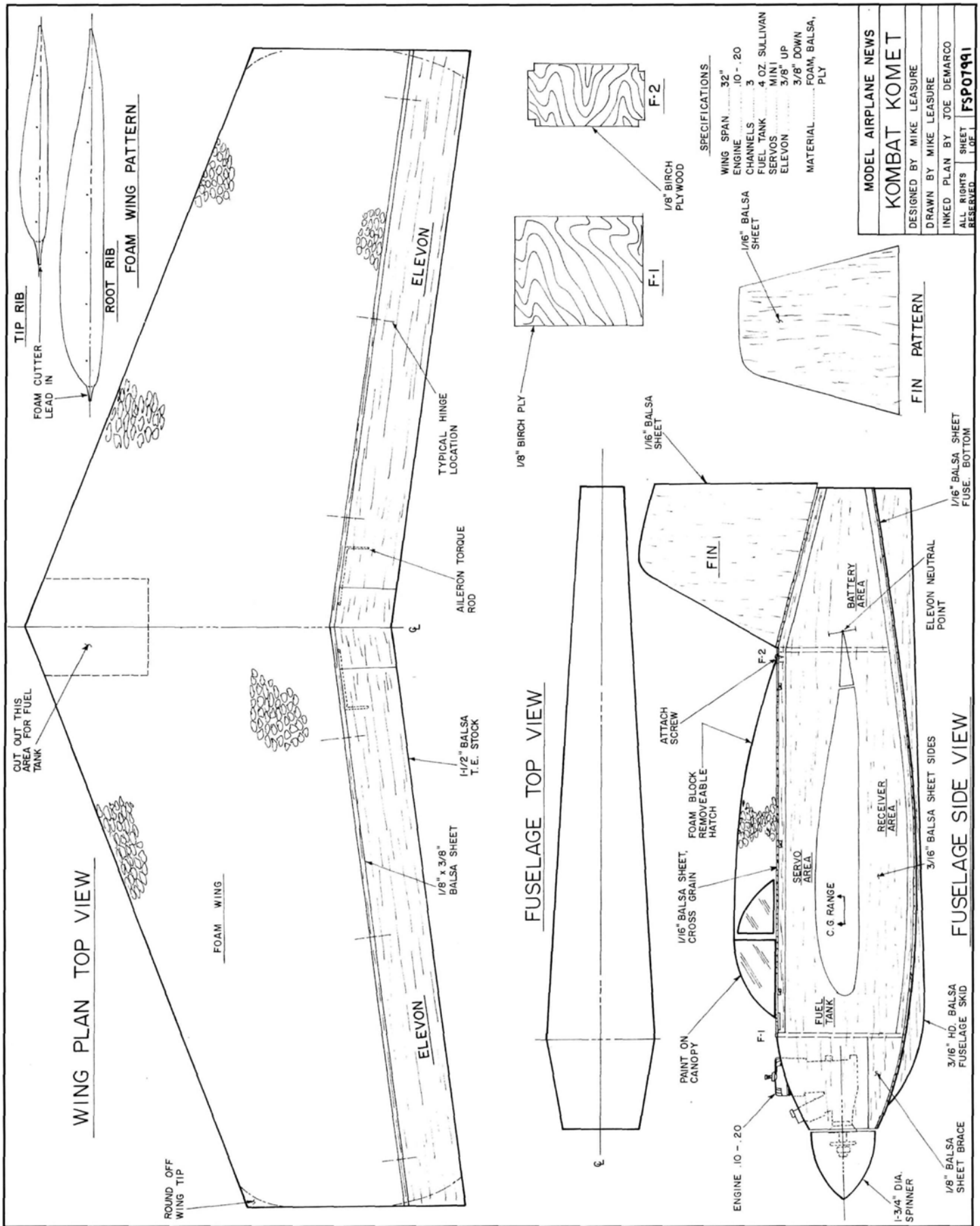
The completed fuselage and foam blocks, which must be shaped with a hot-wire cutter.

WING CONSTRUCTION

Cut out the supplied airfoil templates on the plans and glue them to a piece of thin aluminum. A piece of scrap house siding works well as template material and it's easily cut with scissors. Drill holes in the templates so you can secure them to the foam block with T-pins. Cut the foam block to the outside dimensions shown, and secure the templates to each end with the flat portion of the airfoil bottom even with the bottom of the foam block. Elevate the wing block

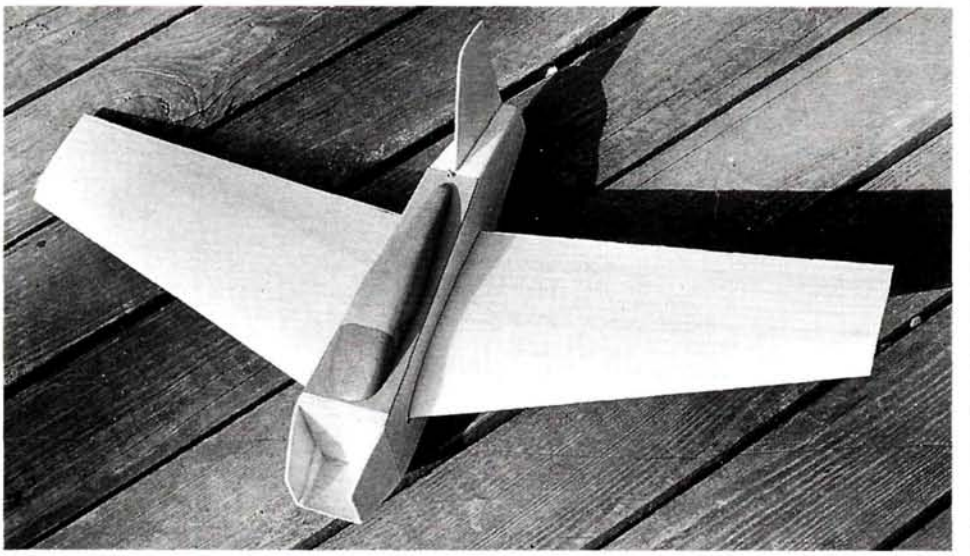
The fuselage, joined foam wing and foam canopy are ready to be assembled.





FSP07991 TO ORDER THE FULL-SIZE PLAN, SEE PAGE 128 OR CALL (800) 537-5874

Kombat Komet. Designed by Mike Leasure, this 1/12-scale combat model of an Me 163 is easy and inexpensive to build. It features a balsa and ply fuselage and foam wings. WS: 32 in.; L: 20 in.; engine: .10 to .20; LD 2. **$14.95.**



Add a .10 to .20 engine, radio equipment and some paint, and you're ready to go!

above the workbench to allow clearance for the hot-wire saw. Cut evenly from front to back by moving the hot wire more quickly along the larger chord template. Complete the top and bottom cuts. Discard the excess and trim the trailing edge (TE) as shown on the plans. Repeat for the other wing half.

Attach the wing halves at the root with epoxy. Cut out the fuel-tank area as shown on the plans. Epoxy a piece of ⅛x⅜-inch balsa to the TE. Sand the leading edge (LE) round and the TE balsa smooth with the foam. Fiberglass the wing surfaces top and bottom with ¾-ounce glass cloth and epoxy finishing resin mixed 50:50 with denatured alcohol. I use a playing card as a squeegee.

When the wing is cured, finish-trim and sand it. Align the completed wing with the fuselage and attach it with small dabs of 5-minute epoxy around the perimeter. Final wing attachment is accomplished by glassing the fuel-tank cutout area inside the fuselage. This creates a robust fiberglass box that also supports the wing center section. Seal the LE with crepe-paper masking tape where the top and bottom layers of fiberglass end. The final step is to cut and attach the ailerons. The torque rods are simply bent wire with small tabs for the clevises soldered to them. I have used an assortment of hinges on the 163s I have built and have gap-sealed a few. It seems to make little difference to performance but helps to reinforce the hinge line. Losing an elevon on a flying wing is bad news.

ENGINE AND RADIO INSTALLATION

Observe the thrust line on the plan. Mount your engine on the firewall with blind nuts and screws. If you don't use a straight-flow muffler, you may need a muffler extension. A 4-ounce fuel tank fits neatly in the wing root cutout and provides enough fuel for engines up to the O.S. .20. If you put a .25 on this plane, as the new combat rules allow, you're on your own. Try the .20, and when the adrenaline is at last out of your system, I think you will agree that the .20 is plenty of engine.

The radio installation will differ with the engine used. If you use a large engine, you'll need to add a standard battery pack in the tail for proper balance. Micro- or miniservos will fit three across in the narrow fuselage and will also reduce weight. You'll need a radio that's capable of mixing two channels for elevons.

The war paint of choice for combat models is brushed-on latex sealed with polyurethane varnish. It is easy, cheap, fast and will provide a satisfactory scale representation for the model. Decals are fast and easy but add to the cost.

AT THE FIELD

Tune the engine to run at maximum rpm with the plane held vertical. Verify that the controls are mixed and functioning in the correct directions. Hold the model on its CG, below the wing, and launch with a strong push, slightly nose high. If the balance, neutral elevon deflection and throws are correct (as per the plans), you will be rewarded with a very nice flying model. Watch the model carefully when you are flying. I flew the prototype with a camouflage scheme, and it completely disappeared when flown in front of the tree line. I recommend the scale red scheme or something bright to keep the plane in view. This model can be flown for sport, or it can be put to work as a combat platform. Either way, it is simple to build, easy and fun to fly and should be a welcome addition to your hangar.

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.*

NORVEL 1/2A TUTOR

by Randy Randolph

PHOTOS BY RANDY RANDOLPH

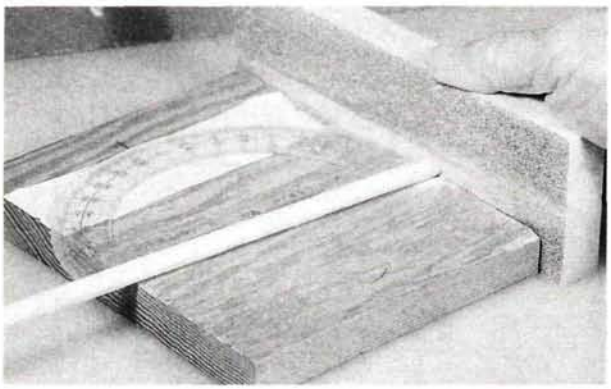
Master the ABCs of schoolyard flight!

AS FAR AS I KNOW, the Tutor is Norvel's* first entry in the kit business. The airplane itself, with its nifty wheel pants and natty trim, is indeed a sporty-looking airplane. It is a little larger than one would expect for .049 to .061 power, but because it is a trainer (hence the name), that's on the plus side; novice pilots can see it more easily.

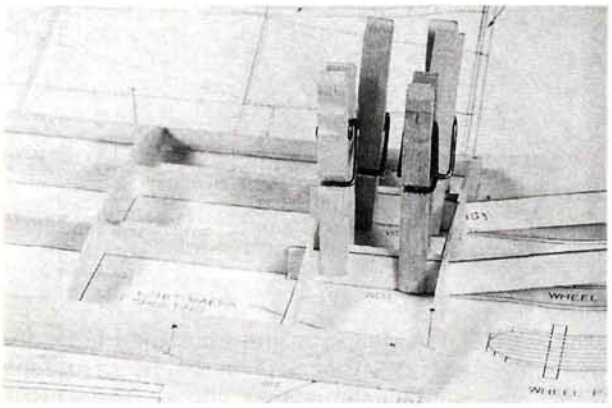
With that thought in mind, I suggest that red or orange covering might be a better choice for the trainee than white, which looks good but tends to become hidden in the clouds. Larger wheels also could be substituted for the nifty wheel pants; performance would not suffer, and the novice pilot might find the landings more forgiving. For sport flying, however, a white Tutor with red and yellow trim—complete with pants—sure looks good in the air!

ON THE WORKBENCH

Opening the box produces a psychedelic effect because there's an explosion of color. You see, the decals are on top of everything, and they are bright red and zigzagged. Underneath the decals are neat stacks of die-cut balsa sheet, landing gear, assorted hardware, strip wood, die-cut plywood, a set of rolled plans and a well-illustrated instruction manual.



Using a simple angle-sanding device made sanding the dihedral bevel into the spars and leading edge quick and easy. Mark the top of the round leading edges so that they can be installed correctly at the center.



Clothespins are great clamps for holding ply dihedral braces to spars while the glue sets.

Following the manual, the first step is to label the parts while they are still in their host sheets. Not only is this a good idea, but it is also imperative: some of the parts look alike. The dies must have been new and sharp because the parts come out without any crushed edges.

The wing is first, and it's easily built over the plan. It is surprising that so few ribs are used. The rib spacing is 3¾ inches, which is pretty wide for a wing with a 7-inch chord! The advertisements say "fewer parts," and this definitely applies to the wing. The leading edge (LE) is a hardwood dowel. I have used balsa dowels for LEs for a long time, and I think they save a lot of work. The trailing edge is built up, and I have always thought that was the best way to go in that area.

The wing has two main spars that are joined with plywood dihedral braces at the center. The dihedral is about 5 degrees in each panel, so I sanded that angle into all the spars as well as

SPECIFICATIONS

Model: ½A Tutor

Manufacturer: Norvel

Wingspan: 47.5 in.

Wing chord: 7 in.

Wing area: 332 sq. in.

Weight: 26 oz.

Wing loading: 11.3 oz./sq. ft.

Length: 27 in.

Radio req'd: 3-channel (motor, rudder, elevator) with miniservos

Engine req'd: .049 to .074

Engine used: Norvel .061 Big Mig

Price: $37.99

Features: high-quality wood and nicely die-cut parts; hardware package; illustrated instructions; aluminum landing gear; three-color decal sheet; plastic wheel pants.

Comments: at full throttle, the Tutor moves out and is a pretty solid airplane! In this configuration, its bag of tricks includes nice round loops and wingovers with a stall turn thrown in for good measure.

Hits

- Clean die-cutting.
- Easy-to-use decal sheet.
- Hardware package that includes Nyrods and clevises.
- High-quality wood.
- Well-illustrated manual.
- Good-looking wheel pants.

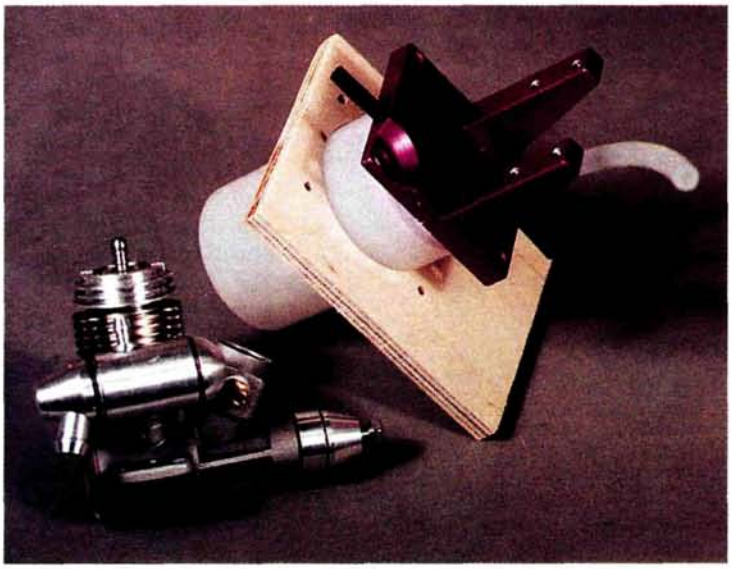
Misses

- No top view on plan.
- Lack of bottom sheeting at wing center.

Easy Engine Mounting

The Slickmount from JK Aerotech is just about the handiest thing yet for the small engine aficionado! With a cast-off 35mm film can for a fuel tank, the Slickmount is mounted right through the firewall and completely seals it so no exhaust residue can seep into the cabin area. A 1¼-inch-diameter hole saw makes the hole in the firewall, and wood screws through the mounting plate clamp the mount into place.

The mount is made out of machined aluminum and is very light and solid. It is drilled for the engine of your choice and comes with mounting screws and weighted fuel line. The mounts are available in three versions: beam mounts for .049 to .061 engines, beam mounts for .09 engines and a radial mount for Cox .049 Bee-type engines. The 35mm film can holds nearly 2 ounces of fuel, which is sufficient for more than 10 minutes of engine time for most small engines. Filler and overflow tubes are machined into the mount, so you don't have to disconnect the fuel line when you fill the tank.



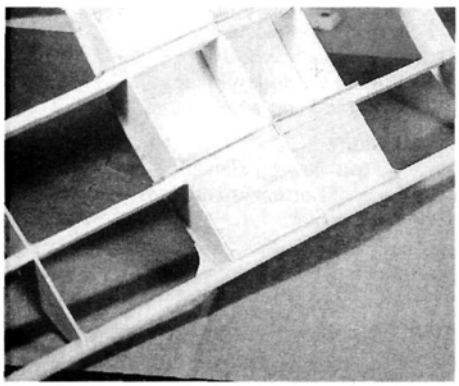
More information is available on the JK Aerotech website: http://www.teleport.com/~jackman/JKAerotech/JKA.shtml.

the LEs. I marked the top of the LEs so they could be fit at a glance. After building the left wing, including the dihedral braces, I built the right wing onto the left by joining the spars and elevating the left tip to the proper dihedral angle. The finished wing was dead straight, and when the right panel came away from the board, it was finished except for sanding. Even though I used aliphatic resin, I finished the wing in less than two hours. I inlaid 1/16-inch sheet on the forward part of the bottom center section. It was not called for on the plan, but it stabilized the wing where it meets the fuselage.

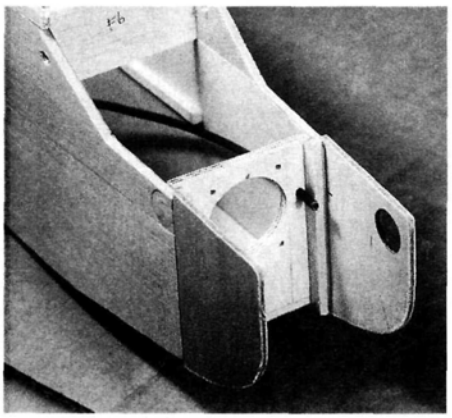
At this point, I digressed from the construction sequence outlined in the manual and glued the wheel pants together so that the glue could cure while I did other things. These pants are built simply and accurately right over the plan.

ON TO THE FUSELAGE

Each fuselage side is made out of two die-cut pieces that are edge-glued together. It is a good idea to check the mating sides to be sure that they fit properly before gluing. Use masking tape over the joint to hold them together while the glue sets. The 1/32-inch ply doublers are then added to the sides (one right, one left). The plans show each fuselage side with exterior former position marks so that each side can be positioned over the plan and marked to properly position the formers. By drawing the former positions on each side, you are less likely to make two left or right fuselage sides by mistake! Gluing 1/32-inch ply doublers to the inside of the fuselage sides and 1/8-inch ply cowl sides to the front completes each fuselage side. This is a good time to drill the sides for the dowels that hold the wing in its mount.



Some 1/16-inch sheet, inlaid in front of the forward main spar at the bottom center section, allowed the wing to be seated more securely in the wing mount.

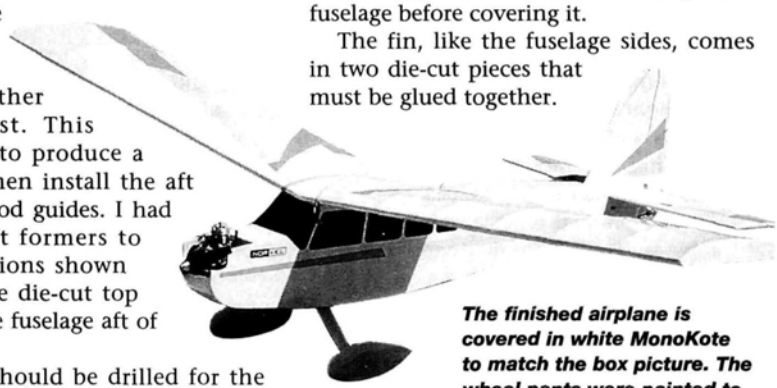


The firewall (shown with the throttle line attached) is drilled for the Slickmount. Because the tank is part of the Slickmount, there was no need for a hatch, so I sheeted the area between the firewall and the wing mount.

Frame up the fuselage by gluing the aft cabin former, the aft battery floor and front wing support former to one side and, when it's dry, assemble the second side over the first. The die-cut bottom aft sheet fits inside the fuselage sides when they are joined together at the tail post. This makes it easier to produce a true fuselage. Then install the aft formers and Nyrod guides. I had to trim both aft formers to match the positions shown on the plan. The die-cut top sheet finishes the fuselage aft of the wing.

The firewall should be drilled for the engine mount. In my case, that required a 1 1/4-inch hole and four small holes for screws that attach the JK Aerotech* Slickmount (see the sidebar, "Easy Engine Mounting") to the firewall. An 1/8-inch hole for the throttle line finishes the firewall. Installing the battery floor first can help you to position the firewall before you epoxy it into place. Add the landing-gear mount, then complete the bottom and the turtle-deck sheeting. The plans show a hatch just behind the firewall to allow for a fuel tank, but because the tank is part of the Slickmount, no hatch is needed. Though it is not shown on the plans, I continued the bottom sheeting up near the center of the cowl sides for better streamlining and to give the sides some extra support. I sanded the completed fuselage before covering it.

The fin, like the fuselage sides, comes in two die-cut pieces that must be glued together.



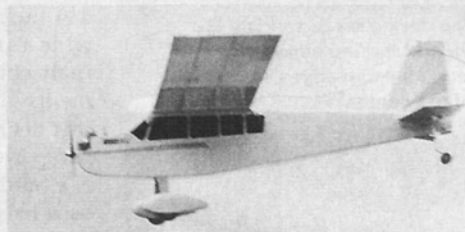
The finished airplane is covered in white MonoKote to match the box picture. The wheel pants were painted to match the covering.

FLIGHT PERFORMANCE

It would be difficult to praise the Norvel Big Mig .061 engine enough. It starts easily, offers plenty of power on 15-percent fuel and has an excellent throttle! With the .061 on board, the Tutor was anything but under-powered! On the day of the test flight, the wind was calm (unusual for Texas) and the Tutor flew from a standing hand launch with ease. It did require some trim to settle in on a level flight path, but once trimmed, it held that trim at all throttle settings.

• HIGH-SPEED FLIGHT

At full throttle, the Tutor moves out and is a pretty solid airplane! In this configuration, its bag of tricks includes nice round loops and wingovers with a stall turn thrown in for good measure. It will also fly inverted, but it is not a bit happy and needs a lot of elevator. Snap rolls are nice and quick when it is slowed a little. In fact, I was able to execute a loop with a snap at the top that looked pretty good. Don't bother trying for an axial roll, however; it's just not worth the effort! After all, when a novice pilot has learned to do all these tricks, he's ready to move on from a trainer, anyway.



• LOW-SPEED FLIGHT

The Tutor has a fairly big wing that does its job keeping the airplane in the air with very little power. The Big Mig had to be slowed below 5,000rpm to allow landings; anything above that and the airplane was still flying. At low speeds, the response to rudder control becomes faster, so the trick is to be gentle with that control; this airplane will snap! Three-point landings are easy and smooth on a good runway, but this wheel-pant/landing-gear combination does not do well on grass fields! Switch to 2- or 2 1/4-inch-diameter wheels, and forget the pants when flying from grass; the airplane won't know the difference, but you will when you land!

The elevator halves must be glued to a hardwood carry-through to complete that assembly. The stab and rudder are die-cut and need only to be sanded before they are covered.

FINAL STEPS

The wheel pants are next. I used a hobby knife and Dremel sanding drum to carve them to shape. The final shaping was done with 100-grit sandpaper. The pants are a perfect fit for 1¾-inch-diameter wheels and look great.

I spent only a few hours covering the whole airplane (not including the wheel pants) with white MonoKote*. The flat sides of the fuselage added to the ease of covering. I also used MonoKote hinges, which provide a tight hinge line. After covering, I painted the firewall and inside of the cowl with thinned epoxy cement to fuelproof it. I also painted the wing mount and the landing-gear mount in the same way. I cheated and painted the wheel pants to match the covering; it was much easier than covering them!

The elevator and rudder Nyrods cross on their way back to the tail, which worked out well for the way my servos were set. One thing to watch: a right and a left control horn are provided; install them one at a time so you don't drill a hole that doesn't match the horn. The provided mounting screws don't need to be shortened—a nice touch. After I installed the control horns, I epoxied the tail into the slots in the fuselage. I used a different style of tailwheel bracket because I had it handy, and it was the fastest way to go.

The decals are somewhat forgiving. While applying one to the wing, I dropped it in the wrong place and was able to peel it up and still place it properly. Knowing there is a little fail-safe in a job always helps your confidence!

I installed the radio system with everything as far forward as it would fit in the cabin, but I still needed 2 ounces of additional weight under the engine to balance the plane as shown on the plans. Overall weight, including the extra lead and mini radio system, was 26 ounces—not bad at all.

Although the Tutor is offered as a beginners' kit, I think that some previous experience would be helpful before attempting construction. It is definitely a trainer in the air but, as always, I recommend that you have a qualified flight instructor in attendance for the first few sessions.

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.* ✦

The finished spinner on a Top Flite P-51.

It can be hard to find a spinner that's the right size and shape for your scale model even if you're building a P-51. It's even more difficult to find a spinner that's more than 3 inches in diameter, much less the correct shape. Manufacturers of most P-51 kits reduce the model's nose diameter so that they can find a commercial spinner to fit the kit. If you have a model other than a P-51, you usually don't even get that far.

It's easy to make a scale spinner. I've used the following technique to make spinners for a Top Flite P-51, an 86-inch-span Zero and a 36-inch-span Westland Wyvern. I made the Zero spinner of basswood and the others of balsa. The largest was used on a SuperTigre 3000 and the smallest on an O.S. .10. That range ought to cover everything. White pine and basswood are more durable (fortunately), and balsa is lighter. Use balsa to make spinners for up to about .60-size engines; use harder woods for larger engines.

This 36-inch Wyvern sports a homemade balsa spinner.

PHOTOS BY VANCE MOSHER

by Vance Mosher

MODEL AIRPLANE NEWS
HOW TO

Custom-Build a Scale Spinner

In any size, shape and color

IN THE WORKSHOP

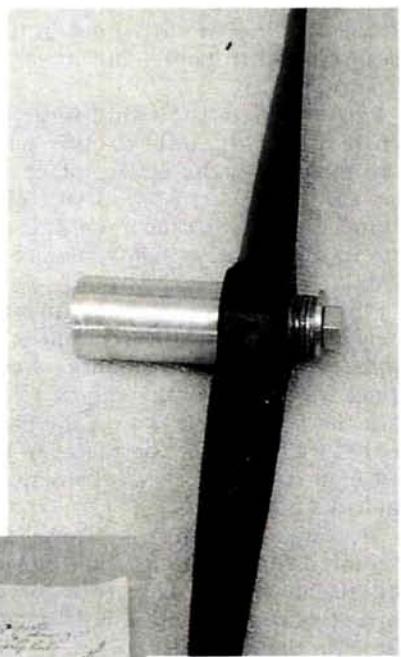
You do need to know the correct size and shape of the spinner in your scale. The place to find that is the scale 3-view, but also measure the front end of your model. To scale a small drawing to the correct size, set a copy machine to the largest magnification and re-copy your 3-view's spinner a few times until you get close. Then do some arithmetic to figure the last scale-up and copy it to the correct size. The lines will be blurry and too thick, but you can re-draw it reasonably by hand.

Make a few copies of your drawing. Glue one onto card stock for a template and draw lamination lines on the other, per the diagram. Cut out the *inside* of the template. The lamination lines are ¼ inch apart for ¼-inch-thick wood and are used to determine the correct diameter for each wood lamination. This saves you a lot of sanding and a lot of wood, too.

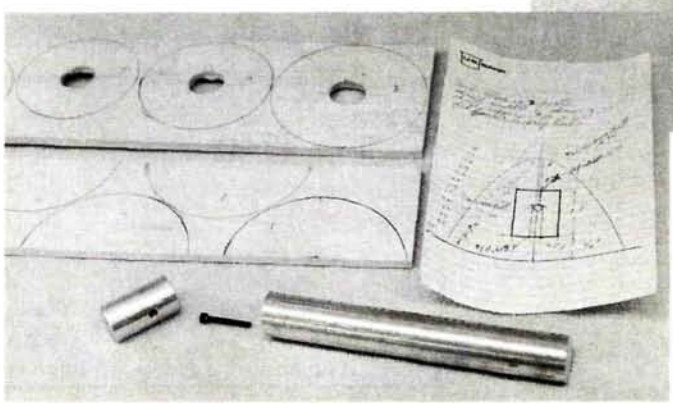
I made the spinner shown in the photos on a drill press because a lot of people don't have access to a lathe. Use the fastest turning speed possible for a rounder, smoother spinner.

You'll also need a 6-32 tap, a tap handle, a no. 36 tap drill, two bolts, a nut, a few washers, a tap of the same thread as the one on your engine crankshaft and a suitable tap drill (e.g., the Saito .91 on the P-51 uses a 7x1mm tap and a 15/64 tap drill). The tap-drill size is listed on the tap package. Get the longest bolts you can find in the correct size.

Find a piece of hard aluminum bar stock that's approximately 1½ inches long. (It can be as small as 1-inch long



The bar-stock prop nut is bolted to the propeller.



Bar-stock prop nut, lamination guide and balsa with large spinner pieces.

with a 3/8-inch diameter for a .10-size engine.) You can also use a smaller spinner screw in smaller engines. Drill and tap the prop thread about 1 inch in on one end and the 6-32 thread about 1/2 inch in on the other end. Be sure the ends of the bar stock are square to the sides and flat before you drill them; a disk sander works well for this. Accurately locate and center punch the ends before drilling. (All of this is easier on a lathe, of course.) Square and hexagonal bar stock will work, too. Cross-drill this new prop nut to clear a piece of 1/8-inch music wire, which you can use as a bar to tighten the nut on the prop. A good place for the hole is about 1 inch out on the nut, at the end of the prop threads.

Consult your drawing and cut all of the wood laminations to the correct diameter with a bar-stock size hole in the middle of the big ones. Use only *partial* pieces up to the thickness of the prop hub. Fit the hub pieces closely to the prop hub, with the grain of the first lamination parallel to the prop. The prop should fit firmly into the spinner. The top hub lamination should be just thick enough to clear the top edge of the prop hub. Set the spinner properly on the prop from front to back; you can shim it later. The bottom of the spinner will line up with the back edge of the prop, flat on the table. This makes the spinner fit closely to the front of the cowl without having to leave room for a spinner backplate. Don't try to fit the laminations under the prop; if you do, you won't be able to get the spinner off the prop later.

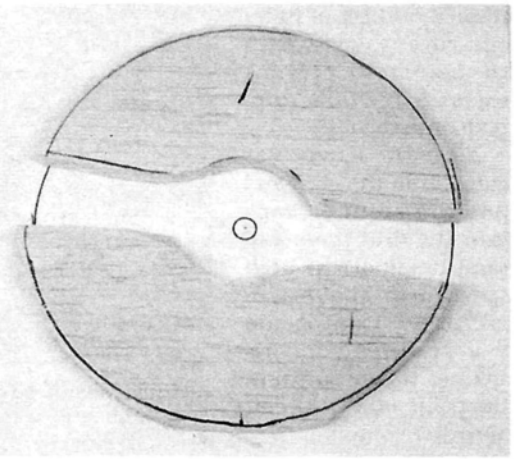
PUTTING IT TOGETHER

Bolt the bar-stock prop nut to the front of the prop. Shim everything up with scrap wood after this because the bolt head sticks out of the back of the prop. Glue the lamination on the face of the prop to the stack with the grain running perpendicular to the prop. Slide this lamination, and the next several, over the prop nut to ensure that they will line up inside the finished spinner. Continue the laminations, gluing each one with the grain at a right angle to the previous one, until you clear the top of the prop nut. *Don't get glue on the prop nut!*

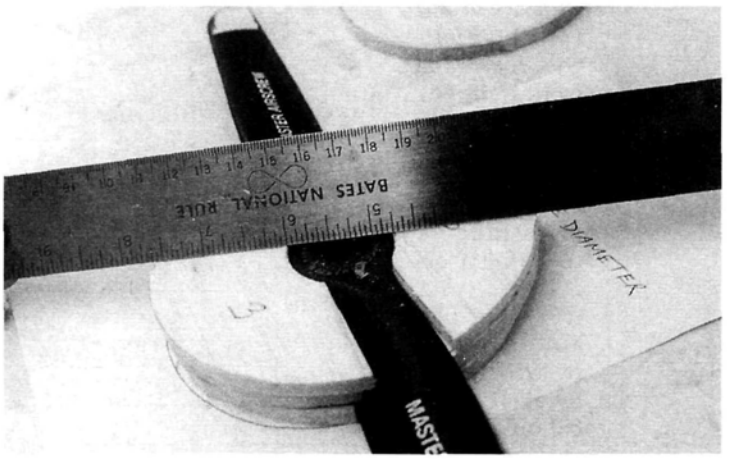
Center-drill a 5/32-inch-diameter hole into the laminations above the prop nut to clear the 6-32 spinner bolt. The very front lamination is center-drilled 7/32 inch to recess the head of the spinner bolt. Slide each of these laminations onto the bolt before gluing, and screw the bolt a little way into the spinner nut to line up the laminations while the glue sets. Glue each lamination with the grain at a right angle to the previous one. Don't get glue on the bolt, either.

Remove the 6-32 bolt. Pull the prop nut and the prop out of the laminated spinner. If you weren't careful with the glue, you can either twist the prop nut out with a wrench on the prop-shaft bolt, or under extreme circumstances, heat the prop-nut *bolt* with a propane torch or a large soldering iron until the glue debonds. Don't breathe the heated glue fumes!

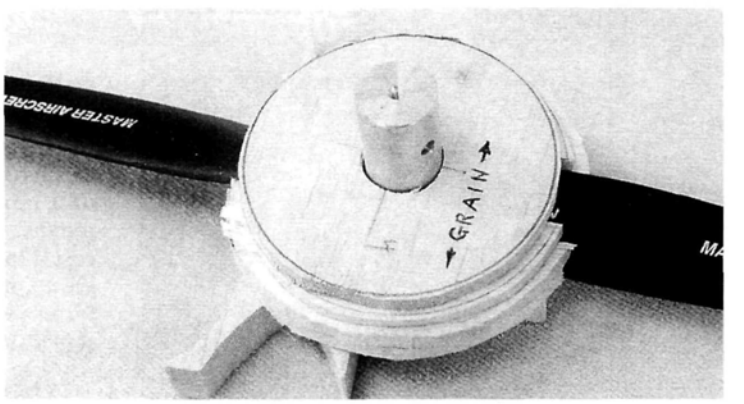
Saw the head off the duplicate prop-shaft bolt and screw and lock it into the spinner nut with the extra prop-shaft nut. Tightly reassemble the spinner, the 6-32 spinner bolt and the prop nut. Leave the prop off and make sure that the spinner doesn't slip on the spinner nut. *After* the spinner had cured, I added a layer of thin epoxy to the inside of the spinner-bolt cavity to make it fit tightly into the spinner.



The first laminations are centered on the circle and are ready for the propeller.



Add hub laminations until they clear the top of the propeller.



The hub laminations and the first prop-nut lamination are shimmed with scrap wood.

MAKING SAWDUST

Chuck the prop-shaft bolt into your drill press and sand the spinner until you get a smooth curve that just touches the edge of all the laminations. If you have cut the laminations accurately, they will provide a template for the correct shape of the spinner. The safest thing, though, is to sand close to all of the laminations, then turn the drill press off and use the template for final shaping. Do all the sanding with a large, heavy sanding block (a piece of 2x4 works well) to minimize "bounce" and get a truly round shape. The cross-grain laminations help, too. Use 50-grit sandpaper for initial sanding and 120-grit to finish.

Cover the front face of your prop with plastic food wrap. Pack the ends of the blade cutout in the spinner (not in the center) with Model Magic* or lightweight spackle and bolt the prop into the spinner. The spackle should completely fill in around the front of the prop at the edges of the spinner. Fill any voids in the surface of the spinner, too, and set it aside to dry. The prop will come out of the spinner when the spackle is dry, thanks to the plastic wrap.

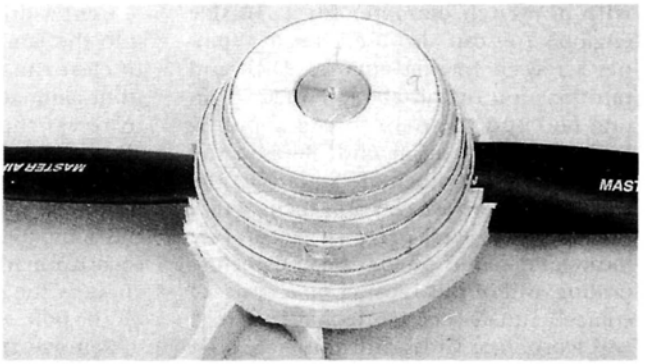
Replace the shaft bolt in the spinner and *gently* sand the spackle smooth on the drill press. Make sure that the spinner is just a bit smaller than the front of the airplane when it's mounted.

FINISHING TOUCHES

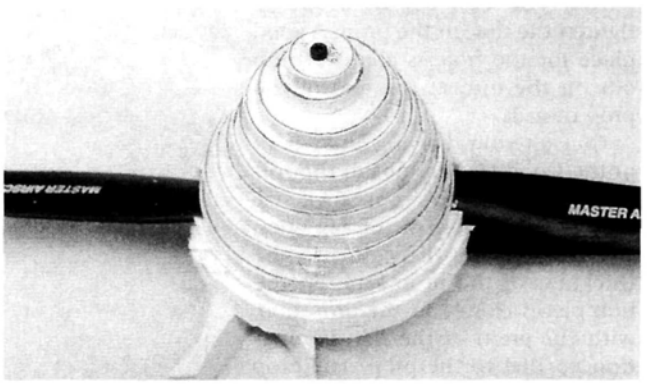
Coat the spinner (including the back) with finishing resin or thinned epoxy and then

add a few coats of fiberglass and a lot of thick, excess resin. This is easier if you cut the fiberglass into "spinner-size" triangles. Put the shaft bolt into the plastic-wrapped prop hub, place this assembly partway into the spinner and clamp it into a vise to hold the spinner upright while the epoxy cures. This helps to balance the spinner. Punch the bolt through a sheet of paper and cover the vise with the paper to prevent excess epoxy from dripping onto the vise.

After the epoxy has cured, trim the glass and put the spinner back into the drill press and sand it smooth at high speed with about 220-grit paper. Paint it and you've finished. This spinner is easy to paint, the paint won't chip off and there's no bare metal back edge. Balance the spinner; weights glued into holes in the rear face work well, but don't get too close to the edge. One way to balance a big spinner is to hang it on a string from its center, like a plumb bob. It will hang level if it is balanced. The spinner will probably be close to balanced to begin with.

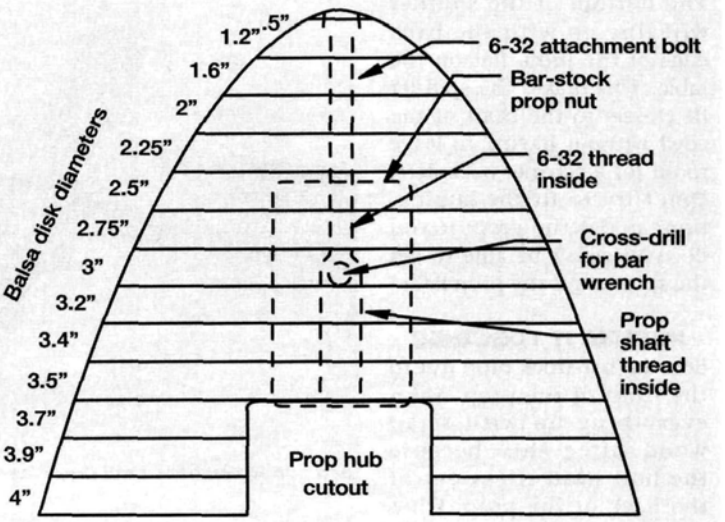


The laminations up to the top of the prop nut.

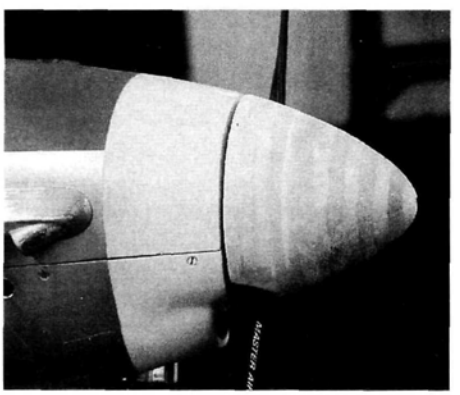


All laminations have been added, and the 6-32 bolt has been installed.

Figure 1. A sample template and laminations guide. This one was used to build the Top Flite P-51 spinner.



This spinner only needs some paint.



The spinner on the Top Flite P-51 only weighs 3½ ounces—about half the weight of a commercial unit—and it's a lot tougher. It's the right shape, too. It also cost a lot less, and it was fun to build—a great combination with immensely satisfying results. Plus, I was able to build something that no one else has.

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.*

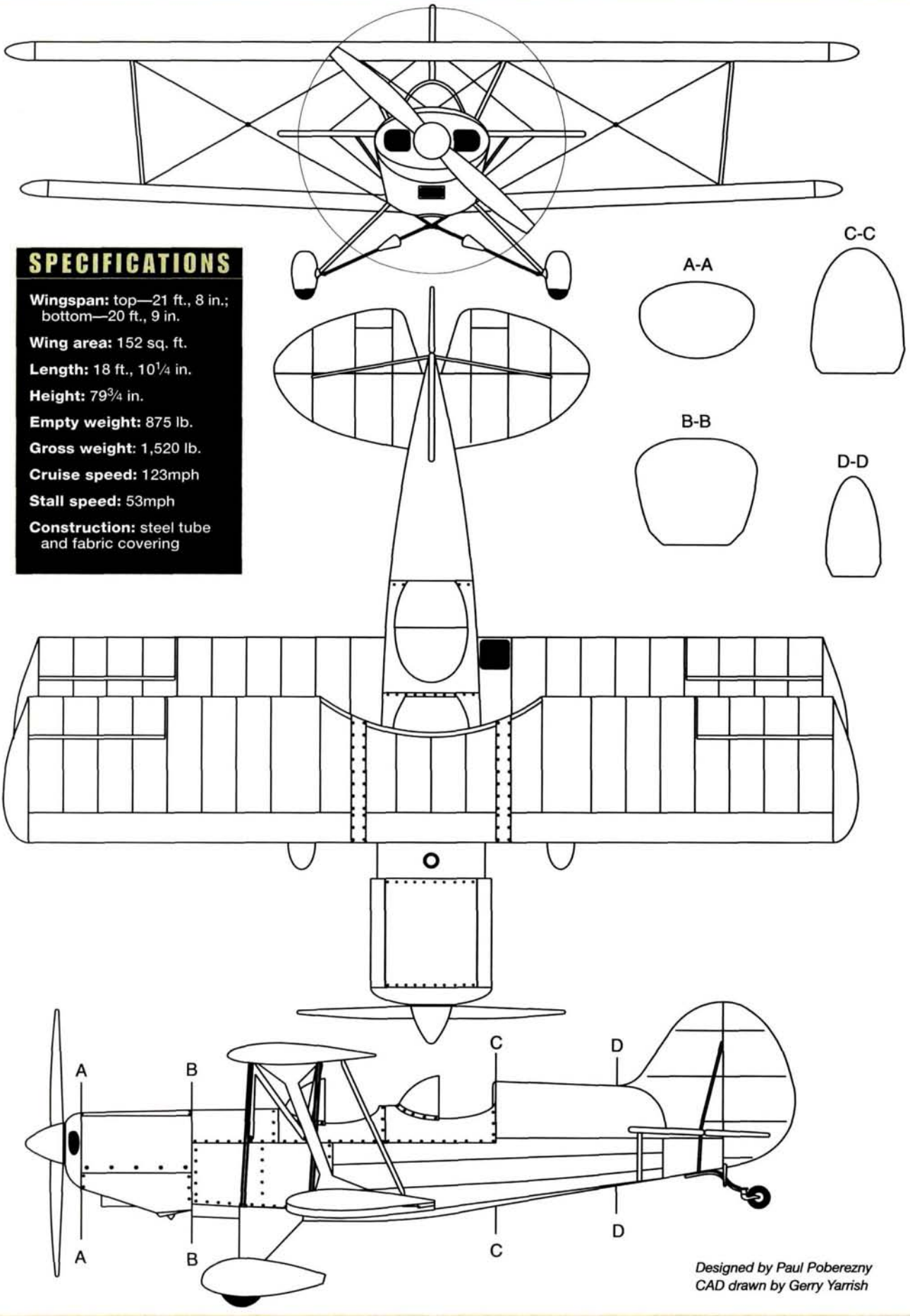
Acro Sport II Biplane

The Acro Sport II biplane was designed by EAA founder Paul Poberezny following the success of his single-place Acro Sport I. Paul designed the two-place biplane as a trainer for would-be aerobatic pilots who wanted to build time toward qualifying to fly the one-place Acro Sport. The original Acro Sport was designed to serve as an aviation building project for students in high school shop classes, some of whom, Paul hoped, would be convinced by the experience to pursue an aviation career. The prototype first flew on January 11, 1972, just 352 days after Paul began designing the aircraft. Both biplanes are built using welded chromoly steel tubes and feature wooden wing ribs and spars. Both are finished with fabric covering and paint.

The prototype is powered by a 180hp, O-360, 4-cylinder Lycoming engine and is part of the EAA Museum's aircraft collection. The Acro Sport II has been licensed by the FAA in the Experimental aircraft category. Plans for the Acro Sport, as well as other Poberezny-designed aircraft, are available from Acro Sport Inc. in Hales Corners, WI, and are specifically intended for the amateur, home-based aircraft builder.

The Acro Sport's long nose and tail moments, constant wing chord and simple cabane and interplane strut design make it a good subject for a scale or sport-scale model. If you're tired of the Pitts or Christen Eagle, try the Acro Sport II.

—Gerry Yarrish


SPECIFICATIONS
Wingspan: top—21 ft., 8 in.; bottom—20 ft., 9 in.
Wing area: 152 sq. ft.
Length: 18 ft., 10¼ in.
Height: 79¾ in.
Empty weight: 875 lb.
Gross weight: 1,520 lb.
Cruise speed: 123mph
Stall speed: 53mph
Construction: steel tube and fabric covering
A-A
B-B
C-C
D-D
A
B
C
D
Designed by Paul Poberezny
CAD drawn by Gerry Yarrish

MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

A low-cost, entry level whirly-bird-of-prey

CENTURY HELICOPTER PRODUCTS

Falcon 46

by Rick Bell

I CAN STILL remember the reaction I got the first time I showed off my new Falcon 46 at the flying field: "Hey, Rick; what heli is that?" someone asked. "It's the new Falcon 46 from Century Helicopter Products*," I replied. Then, the usual question: how much did it cost? When I told my buddies it cost only $250, everyone gathered around it for a closer look. Their smiles indicated unanimous approval. But what, exactly, do you get for such a reasonable price?

Century Helicopter Products (CHP) began to offer less expensive helis about two years ago with the introduction of its .30-size Hawk. Following the Hawk's remarkable success, CHP introduced the Falcon 46. It, too, is targeted at the budget-minded beginner, but it also makes an excellent practice machine for the seasoned 3D heli pilot. Not too many designs do as well as these at both ends of the performance spectrum.

SPECIFICATIONS

Model: Falcon 46

Type: helicopter

Manufacturer: Century Helicopter Products

Main rotor diameter: 53 in.

Length: 47.5 in.

Radio used: JR* X-388S

Radio req'd: 5- to 6-channel heli

Engine used: O.S.* 46FX-H

Price: $250

Features: composite and metal construction, easy assembly, great construction manual, sleek canopy, cool decals and good flight performance.

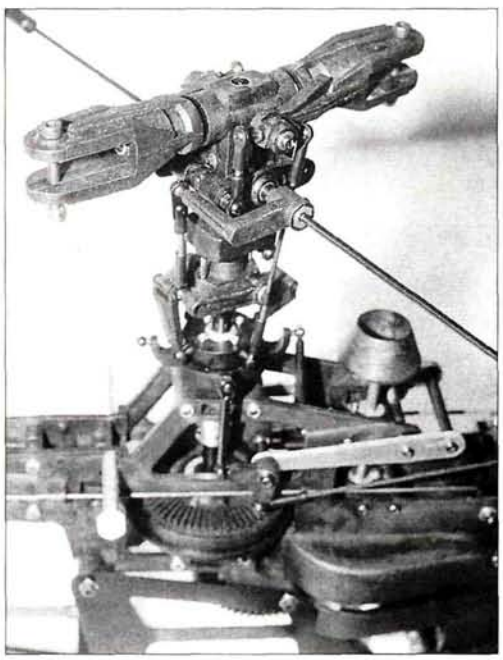
Comments: the Falcon 46 is an easy-to-build, good flying mid-size helicopter. It offers beginners and experts the chance to have a low-cost heli that flies well. Replacement and upgrade parts are readily available.

Hits

- Easy to build.
- Good setup instructions.
- Good flight performance.
- Sleek canopy.
- Prefinished main rotor blades.

Misses

- None.



PHOTOS BY RICK BELL AND GERRY YARRISH

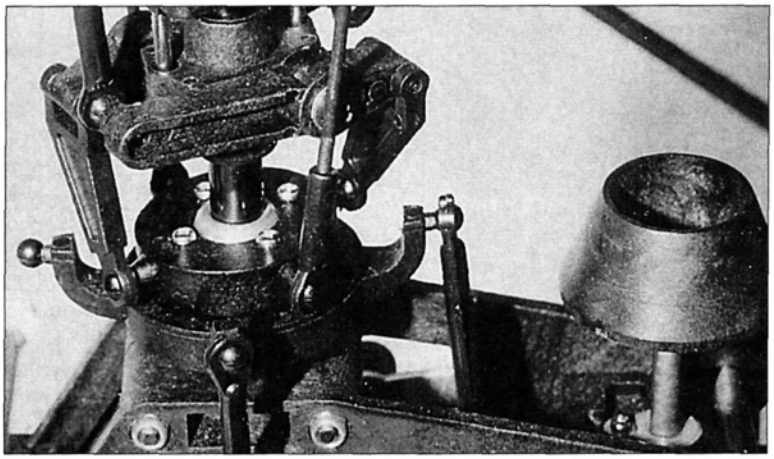
The rotor head uses thrust washers for good collective control. To keep costs down, bronze bushings are used in place of ball bearings throughout.

The Falcon is a builder's kit; it has no pre-assembled components. I like this because I don't have to take apart factory-assembled components to make sure that they were put together correctly. I also like the instruction manual; CHP went to great lengths to simplify the Falcon's construction and supplies exploded-view diagrams as well as concise written instructions to describe each assembly step. For the beginner, this leaves very little room for error.

Another nice feature is that ball links are used on all pushrod attachment points except for the tail-rotor bellcrank, and there are Oilite bronze bushings at most pivot points. Using bronze bushings instead of expensive ball bearings was an excellent idea to keep down the cost of the kit because beginners would not benefit from having bearings. (CHP does offer a ball-bearing upgrade for those who wish to use them.)

CONSTRUCTION NOTES

Assembly begins with the main rotor head. First, guide pins are pressed into the glass-reinforced plastic head block, and then the feathering shaft dampers



The swashplate and washout unit are made of molded plastic; construction is easy.

FLIGHT PERFORMANCE

Considering the Falcon's relatively low price, I was very eager to see how it would compare with other helis I have flown over the years. I bench-ran the O.S. .46FX-H engine before I installed it in the Falcon, so I wasn't expecting any surprises. The engine fired up quickly, and I advanced the throttle to get the main rotor spinning. I let the heli sit for a few minutes so the gears would "seat in" a little before the first liftoff. I first checked the blade tracking; it was spot on, and the head speed was in a comfortable range. The rudder trim was a little off, so I adjusted it as necessary. "Not bad!" was my first impression, as control response was solid without being overly sensitive. Before I tried forward flight, I burned a few tanks of fuel just hovering.

How does it fly? In a word: great! Like the feathered falcon, this is one fast bird; it has positive, agile control response, and loops and rolls are easy to do. I noticed no pitching tendencies during fast forward flight, and autorotation with the stock blades is OK. I do feel autos would be better with a heavier set of blades, but hey, this is an entry-level machine. All things considered, the Falcon 46 is a great heli for beginners and experts!

and the seesaw shaft are added. Do not over-tighten the screws that hold the seesaw shaft in the head block; you might strip the threads.

The blade grips and bell mixers are built next and then added to the head block. Worth mentioning is that CHP chose to use thrust bearings in the head—quite a welcome feature. The next items to be added to the head are the flybar, flybar control arms, weights and paddles. The manual thoroughly covers the alignment of these components and the completion of the rotor-head construction.

The swashplate and washout unit are made of molded plastic and are easy to assemble. Performance upgrades can be made here by installing a metal swashplate and by replacing the bronze bushings with ball bearings.

The starter-shaft assembly consists of two bearing blocks that come with plain bushings pressed into them. The starter shaft is spring-loaded and is pushed down to engage and start the engine; when the engine starts, the spring disengages the shaft. This is a nice feature, as it disconnects the shaft from the drive system and decreases the chance of misalignment vibration.

The drive system is a two-stage affair that uses a countergear on a layshaft that's driven by the clutch; this is the first stage of reduction. The main gear has its drive teeth on the inside of the gear and is driven by a pinion gear on the layshaft. The tail-rotor drive-gear takeoff is molded on the top of the main gear. To minimize play in these assemblies, I used one of the side frames as a fixture to assemble the gears.

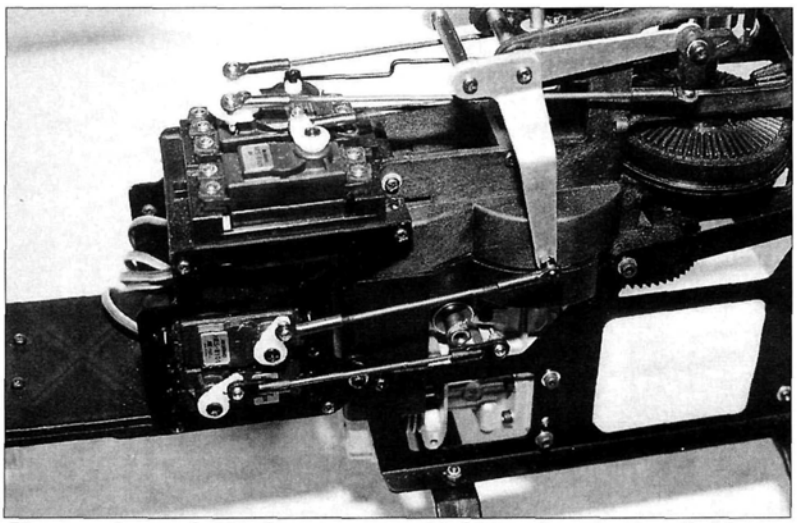
The elevator bellcrank parts are put together next, and these and the gears are captured between the molded upper frame halves when the frames are brought together. Before moving on, be sure to check for the main-gear mesh and end play. Add the collective lever assembly to the frames, and the upper portion of the chassis will be complete.

ASSEMBLY

Before doing any further assembly, you must glue the clutch liner to the inside of the clutch bell. Trim the liner for a tight fit, then roughen the inside surface of the clutch bell and glue the liner into place with JB Weld* (preferably) or another 24-hour epoxy. Once the glue has cured, place a thrust washer on the crank, slide the clutch bell on and screw the clutch onto the crankshaft. The cooling fan is added next, followed by the engine nut, which tightens everything as a unit.

Next, attach the lower frames, fuel tank, engine/clutch assembly and lower cooling shroud. Start by screwing the right-side frame into place, and follow this with the cooling shroud; then fit the fuel tank into place. I had to grind down the lower corners of the cooling shroud slightly to get a proper fit between it and the frames; after that, everything went together well. The manual points out that you should install the lower muffler bolt before you attach the left-side frame, as it's difficult to insert the bolt when the frame is in place. This is also a good time to install a remote glow driver because the engine head faces forward, and it's difficult to get to the plug.

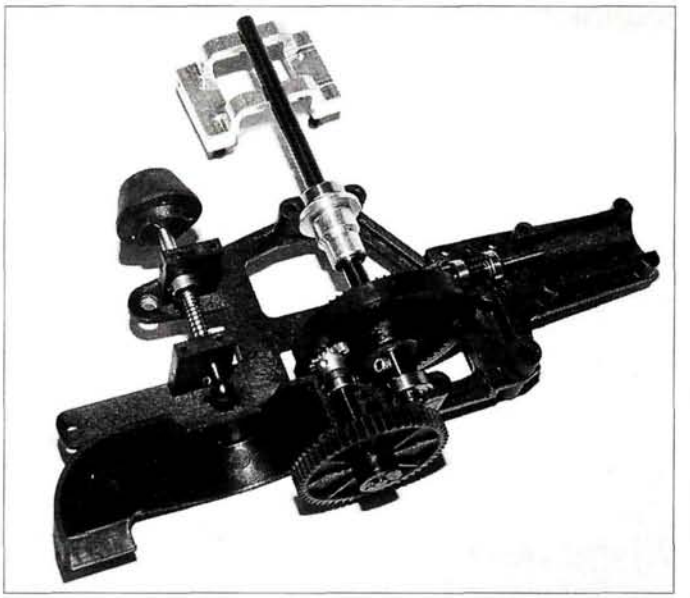
Install the collective and throttle servos on the inside of the servo-tray's left vertical



The servo tray and side pieces are assembled into a box structure that is very easy to attach to the main chassis. Setup of the heli is well explained in the manual.

support, then screw the servo-tray pieces together using the other side support and the top and bottom pieces to form a rigid box. Then screw the remaining servos into place, and attach the entire unit to the main chassis. This is a nice design; on some helis, the radio-tray assembly and servo installation can be difficult.

Next, slide the assembled swashplate and washout units onto the main shaft, followed by the main rotor head. Add the landing gear to the chassis, and the model starts to look like a real helicopter.

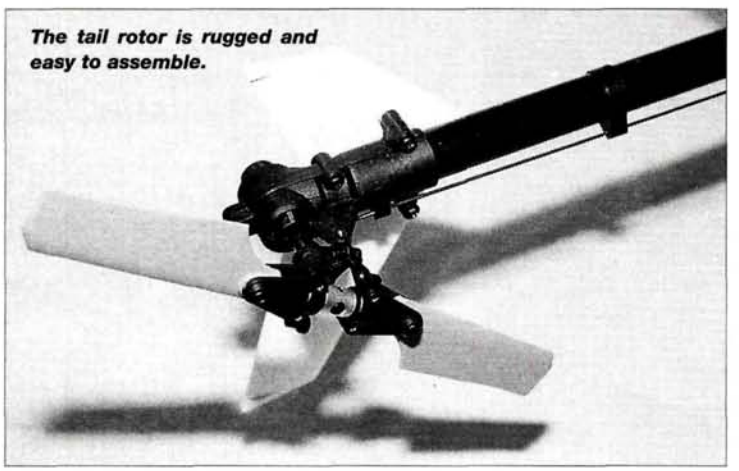


The Falcon has glass-filled composite frames and a spring-loaded starter shaft that disengages from the drive system after the engine has started.

TAIL ROTOR AND FINAL ASSEMBLY

Tail-rotor construction is straightforward: begin by securing a bevel gear to the tail-rotor input and output shafts. A pin goes through the gear and the shaft and is followed by a setscrew in the shaft's end that holds the pin and locks the gears in place. There is no chance of these gears coming loose during operation!

The tail-rotor drive wire runs through a brass tube that is supported by three guides inside the tail boom. Make sure that the brass tube fits easily through the guides. When you're satisfied with the fit, use a long dowel to insert the guides into the tail boom. When everything is in place, use a few drops of thin CA to lock the guides and the tube.



The tail rotor is rugged and easy to assemble.

BASIC SETUP

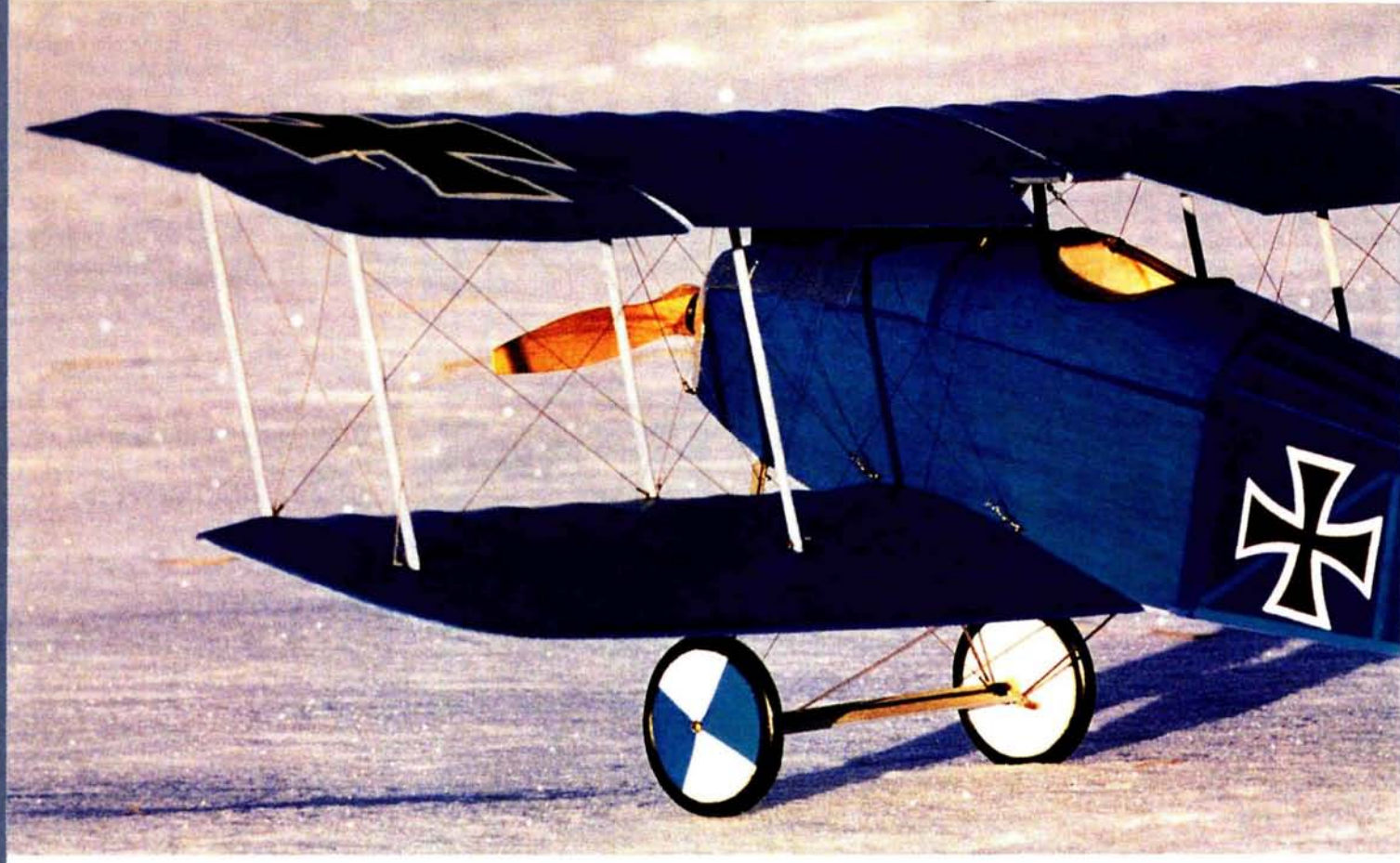
Something that can make or break a helicopter's performance is the basic setup. This is one area on which CHP provides great details, and the manual includes many drawings that explain how everything should be set up. All pushrod measurements and the length of the servo arms to be used are given. Beginners who follow the instructions will not encounter any problems.

Final assembly includes radio installation, muffler attachment, gyro placement and the completion of a few other minor tasks. The large "Falcon" on the side of the canopy is a single decal, and it really gives the heli a distinctive look. Finally, epoxy the main-rotor blade root reinforcements to the blades and then balance the blades. All of this is spelled out nicely in the manual and should be easy to do.

SUMMARY

The Falcon 46 is a low-cost, easy-to-build, mid-size helicopter with an impressive flight performance for an entry-level machine. The manual is well written and gives the beginner a lot of setup information. In stock form, the Falcon 46 is a good helicopter that hits the mark. If only there were a .60-size Falcon on the horizon!

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.*



BUILDING WITHOUT PLANS

by Guy Fawcett

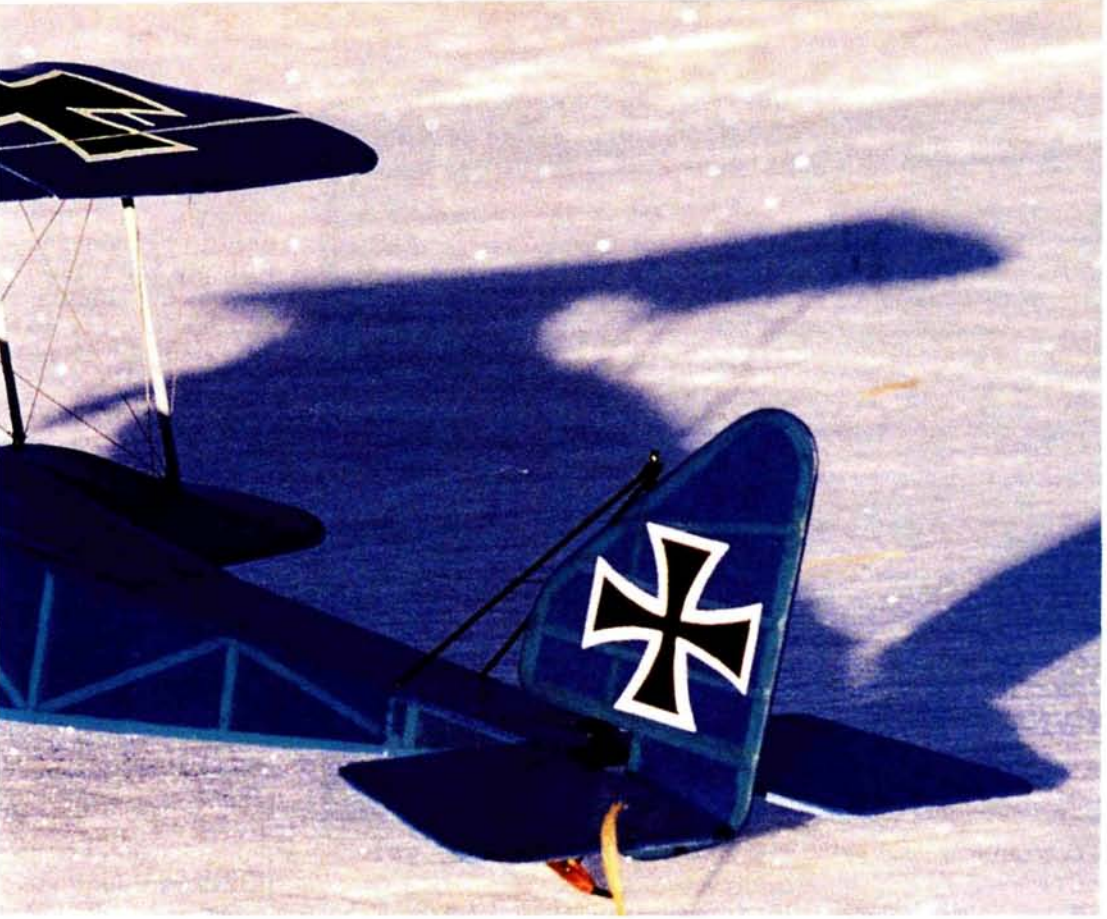
A budding scale modeler wanders along the flightline at the field, and a gorgeous but totally obscure scale model rivets his attention: the local scale guru has shown up with another original. The resulting conversation usually goes like this: "Beautiful plane. Whose kit is it?" Guru (beaming with pride): "It's not from a kit; I designed it myself." "Neat; is there any way I can get a set of plans?" "Plans? I don't use plans; I built it from the 3-views."

Our scale-modeler wannabe's mind fogs over as he tries to contemplate a world without directions. If his grand sum of modeling skill comes from having recently assembled an ARF, building from 3-views may not be for him, but anyone with a few scratch-built airplanes to his credit can take on this task with a good chance of success, and I encourage everyone to try it.

All you need is a 3-view

Once an aircraft has grabbed you by the throat, you at least need drawings that show the plane from the top, the side and the front. The more information the drawing displays, the less you'll have to guess and extrapolate. A common example that comes to mind is that of cross-sections, or lack of them. If the plane in question is a simple box, the absence of cross-sections is of no real consequence, but take a gracefully curved fighter from WW II, and that same dearth of information becomes a hurdle. The work can be done, but it becomes that much harder.

With a 3-view in hand, you have what I consider to be a reduced-size set of plans. I know; you're looking at this aircraft outline with a glazed expression. Where are the wing mounts? How do I mount the engine? What's the thickness of the landing-gear wire, the fuselage sides, the wing ribs? The questions seem to stretch to infinity (and beyond). The knowledge needed to answer these questions must be acquired. If you don't have enough building experience, answer these questions by studying plans of similar aircraft by successful designers (the old standing-on-the-shoulders-of-giants routine). This doesn't mean buying every plan on the market. Most magazine construction articles show a reduced-size version of their plans for reference; use these for guidance. Failing that, buying a plan for a similar aircraft might be useful to obtain construction ideas to build your dream ship.

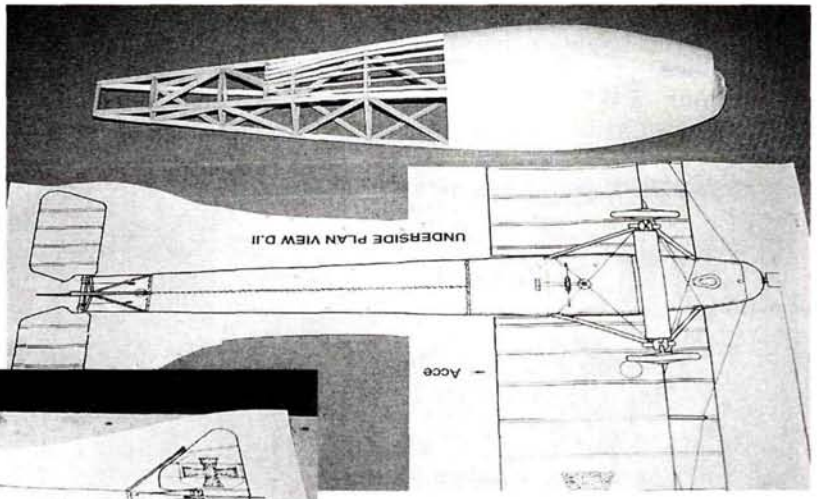


between-the-Wars British biplane fighter) and you have a good, .60 2-stroke lying about looking for a home. Through research, you've found that the only information available for this airplane is a decent set of 3-views and some small, rubber-powered, free-flight plans (another good source of cross-sections). Lo and behold, the catalog also lists a plan for a .60-powered Bristol Bulldog. A contemporary of the Siskin, the Bulldog makes a good match and will provide endless clues for structural components. So, by using the information about the Bulldog, you can decide which size is required for the Siskin drawings and go to it.

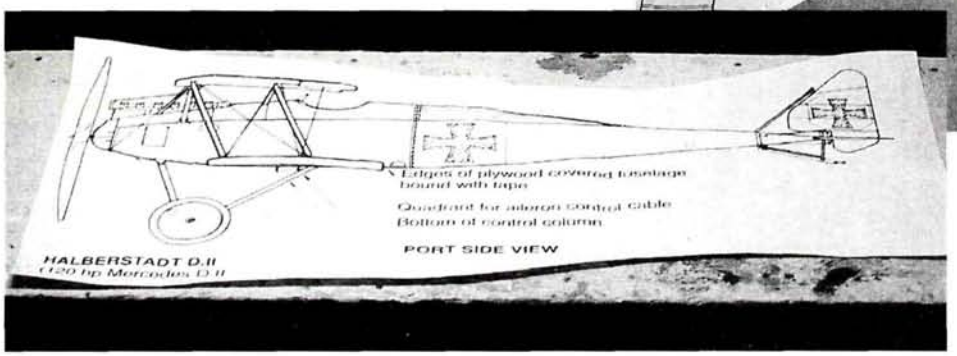
SELECTING A SIZE

The neophyte designer's first big decision is: what size? The answer again lies with the vast collection of plans available from various sources and model magazines. Find a plan with a similar power source and layout; if your subject is a fast monoplane, look for a plan of a fast monoplane, a biplane for biplane, etc.

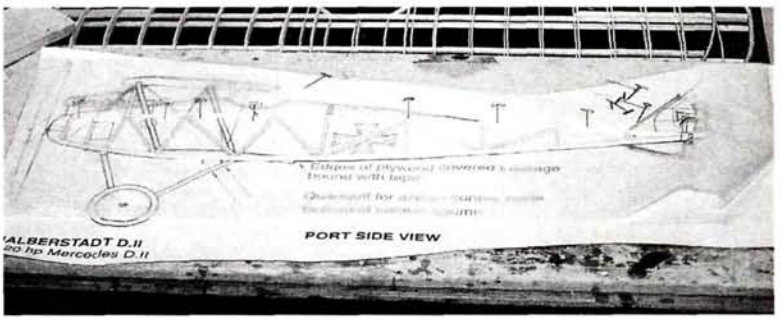
Let's say you decide to build an Armstrong Witworth Siskin III (a



Fuselage drawing with framed-up fuselage beside it.



Fuselage side view.

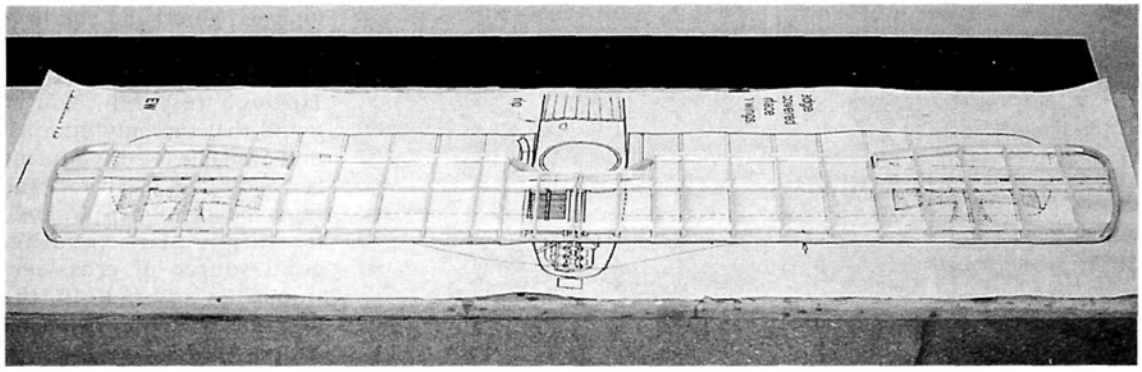


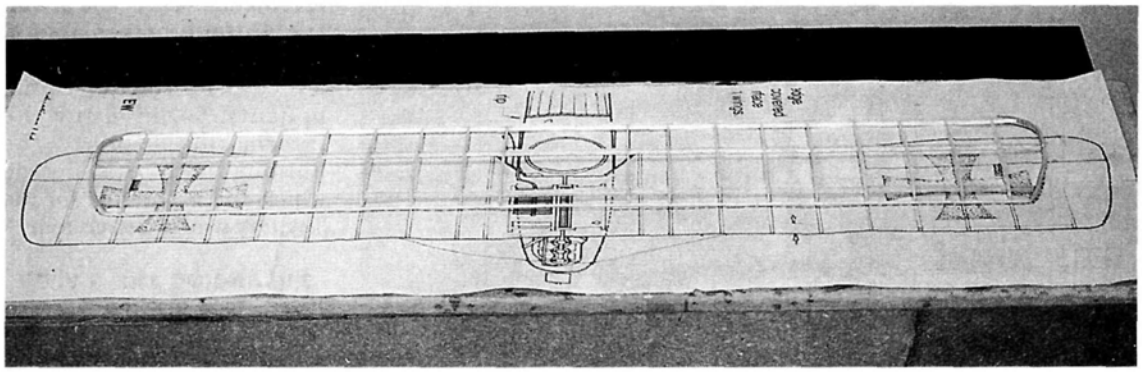
Fuselage side view with the first side pinned down and the wing frames above.

ENLARGING THE 3-VIEW

Having chosen a size, you can enlarge the drawing following one of these methods:

- Laboriously measure, multiply and transfer all points with paper and pencil—the time-honored way.
- Photocopy the drawing onto a transparency and project the image for tracing onto large sheets of paper.
- Use a conventional photocopier to enlarge the drawing to the size you want, then cut and paste the resulting parts together.
- Digitally scan the drawing, insert it into a computer paint program that allows enlargement, then print out the results.
- Digitally scan the drawing, then insert the image into a CAD program and trace over the bitmap to produce a drawing suitable for printing.



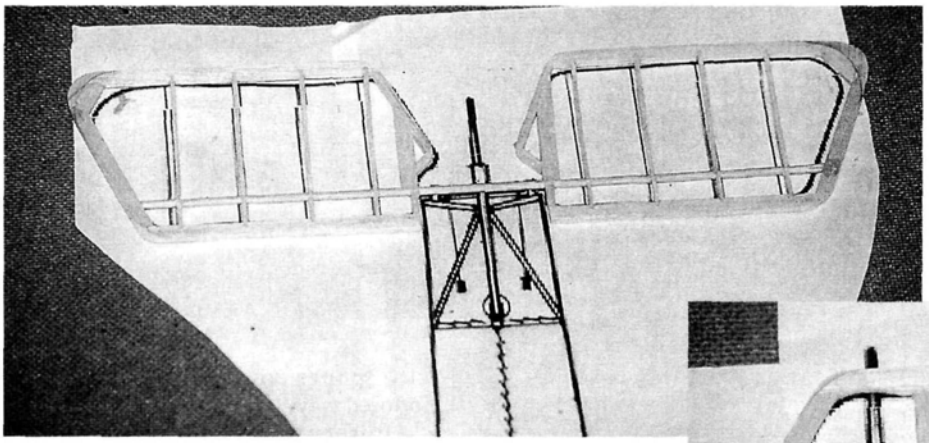


Above: wing drawing with upper wing frame in background. Below: wing drawing with lower wing frame on top.

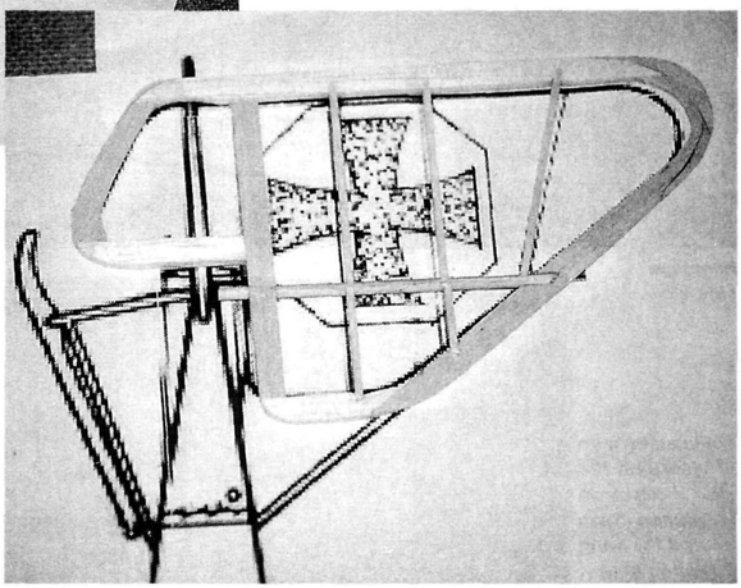
FUSELAGE CONSTRUCTION

When you've enlarged the 3-views to the appropriate size, you can start construction. As an example of the process, I have included pictures of a recent project of mine—a WW I German biplane fighter known as the Halberstadt D.II (see "Final Approach" in the June issue). I began with the construction of the fuselage, which is generally the most complicated part of any aircraft to design. The fuselage has many intricate shapes and model requirements; after tackling this, the wings and stabs seem effortless. The sides are framed directly over the large drawing's outline. Uprights are positioned to correspond with actual points on the full-size structure—landing-gear attachments, cabane attachments, end of the full-size aircraft's plywood sheeting and whatever else is shown in the drawing. These items hint at the underlying structure.

Be aware that designers of full-size aircraft try, as much as they can, to integrate the wing-mounting points, motor mounts and landing gear into the fuselage frame. Using this information and the structural hints on the drawing, connect the dots. Run uprights between these mounting points. Areas that need to be hardened with ply and spruce, such as the landing-gear mounts, can do double-duty if you use reinforcements to connect the high-load points. For instance, I placed a bulkhead on the Halberstadt where the forward leg of the landing gear is attached. This can be beefed up to serve as the rear support for beam motor mounts and, if angled to the rear, it will also act as the attachment point for the forward cabane struts at the top of the fuselage. It must be emphasized that if your drawings are detailed enough, they may show the bare structure, and guessing won't be required. With these points taken care of, the builder/designer must position other structural members to provide sufficient strength and rigidity. This is where design talents enter the picture; if you don't have experience, refer to successful designs of similar aircraft.



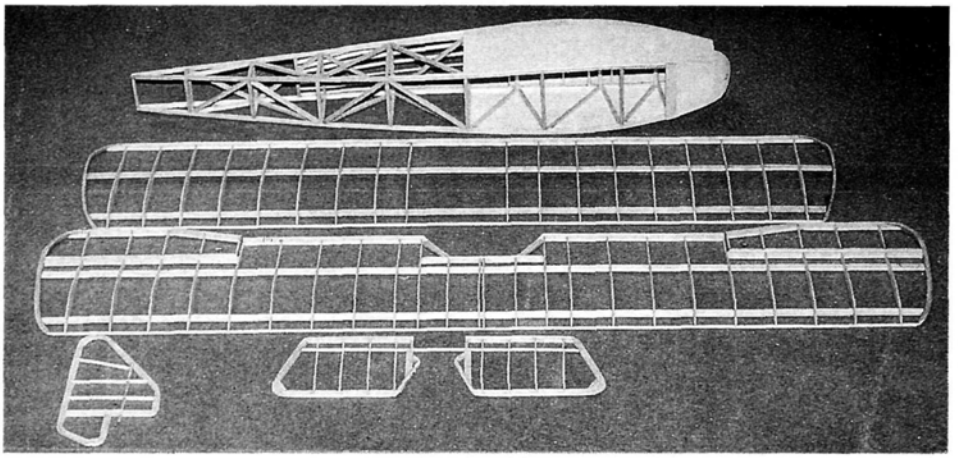
Above: elevator drawing with framed elevator over top.



Right: rudder drawing with framed rudder over top.

CONSTRUCTING THE FLYING SURFACES

To produce the wing, first decide on the number of spars required. Non-cantilevered wings usually have two spars that run the entire wingspan, and their locations can be inferred by the positions of the struts, landing or flying wires, or



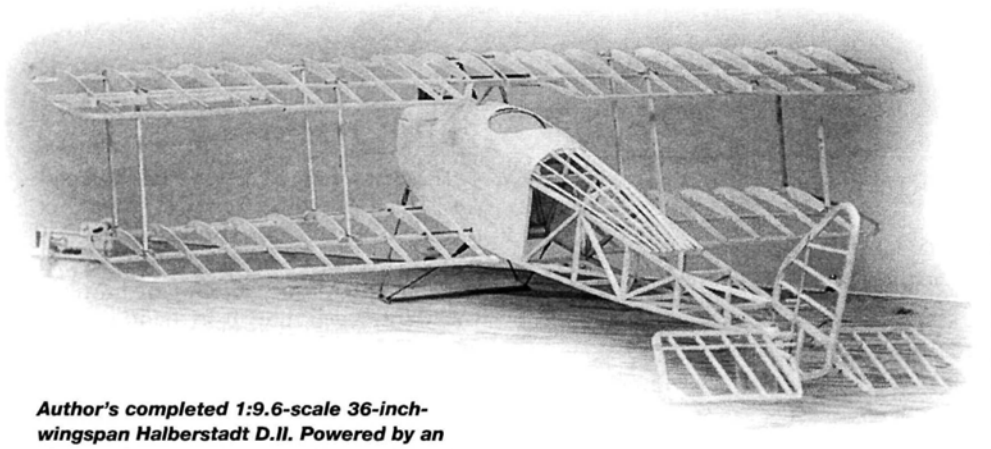
All components framed up.

landing-gear attachment points. Rib positioning for these aircraft is simply a matter of placing a rib at each of the full-size aircraft's rib locations.

A cantilevered wing usually has one main spar—usually highlighted by a row of rivets, if your drawing shows them. If this isn't the case, the spar can be placed slightly behind the CG, but remember to allow space for retracts if the plane is so equipped. Near the trailing edge, this type of wing will also have a secondary spar to which ailerons and flaps are invariably hooked. The rib placement in this type of wing is entirely at the discretion of the designer, but remember to ensure that the ribs are placed properly to support the landing gear and servo positions if needed. Not to dwell on the idea, but if in doubt, refer to the plan of a similar aircraft.

Example time again: suppose you've fallen in love with the Romanian I.A.R. 80—a trim little monoplane with a radial engine. All of your research has turned up only a really good set of 3-views. Well, the I.A.R. 80, with its wide-spaced landing gear and double-taper wing, vaguely resembles the more common P-51 Mustang. Of course, its fuselage differs, but its wing is similar, and that is what we need to examine for construction hints.

Stabilizers can be either slab-sided or of conventional, rib-style construction—covered in sheeting for aircraft with skinned surfaces. For fabric-covered units, the same observations as those made about non-cantilevered wings apply, although the additional option of having a sheeted core with ribs above and below it exists.



Author's completed 1:9.6-scale 36-inch-wingspan Halberstadt D.II. Powered by an electric Speed 400 motor with gear drive, the aircraft has an all-up flying weight of 21.5 ounces.

Don't be surprised if a trip down to the workroom results in your just sitting at the workbench and going over what seems to be an infinite series of solutions to technical problems and doing little actual building. A great deal of thought goes into building in this manner, but the rewards of having a unique model and of being able to say, "I built it from the 3-views" are well worth it. Mind you, there is a downside to this new ability: now, when it's time to choose a new project, the entire history of aviation is open to you! Have fun!

Create Razor-Sharp Graphics

by Ed Smetak

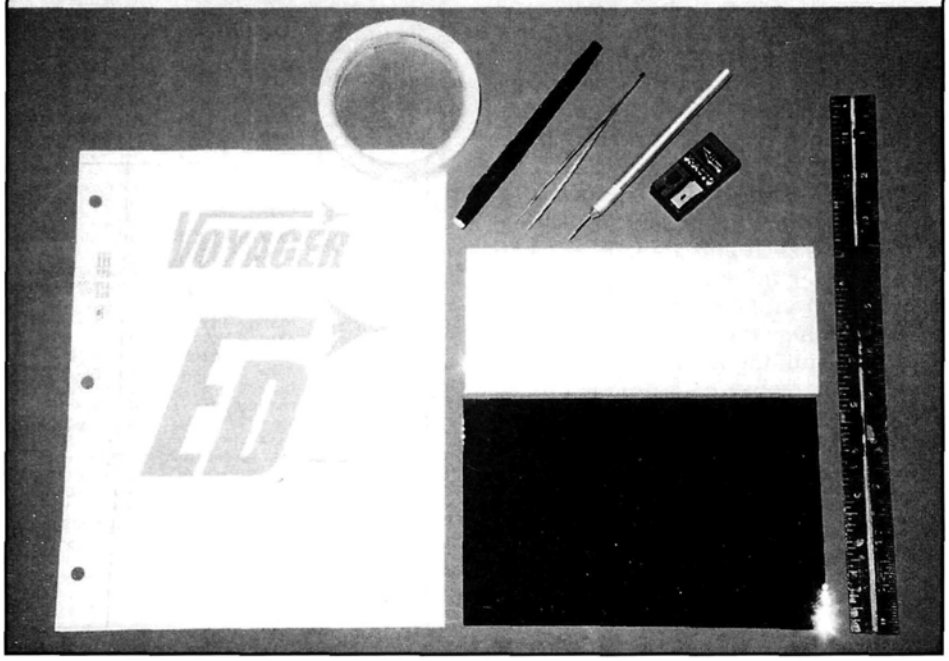
Do-it-yourself decals

MANY MODELERS BELIEVE that letter-perfect custom graphics are beyond their budgets or capabilities. After countless hours of building, they settle for a few "off-the-shelf" decals or leave their aircraft plain and boring.

With the techniques presented here, you'll have everything you need to create strikingly sharp custom graphics that will certainly turn heads; the best part is that it's inexpensive and easy, too!

YOU'LL NEED

- Full-size copy of graphic.
- Lightweight paper (less than 20 lb.).
- Self-adhesive trim sheet (fuel-resistant).
- X-Acto knife and no. 11 blades, and X-Acto no. 3241 craft swivel knife (optional).
- Fine-point felt-tip pen.
- Masking tape.
- Sharp tweezers.
- Straightedge.
- Clear or semitransparent application tape.
- Post-It note pad (for use on dark-colored models).
- Clear dope and brush.

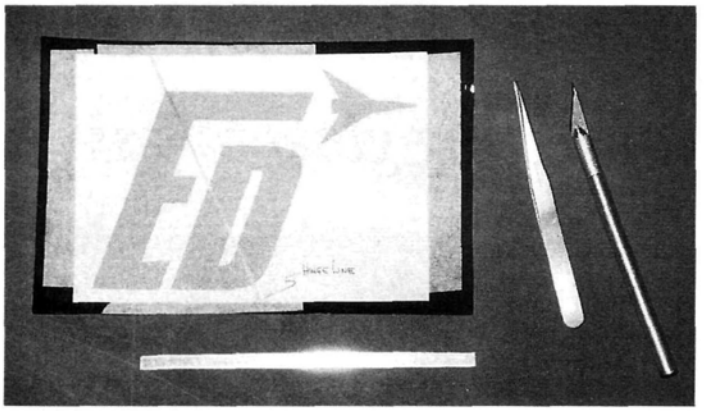


PHOTOS BY ED SMETAK

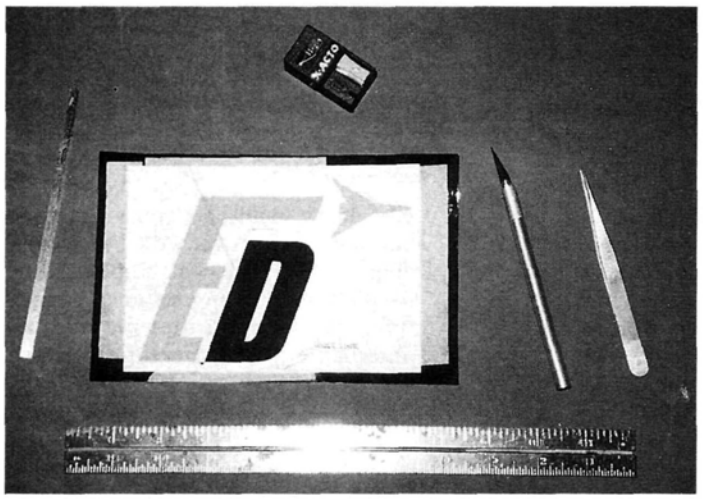
The first step is to create a full-size pattern on a piece of lightweight paper (paper lighter than the standard 20-pound is easier to cut through). You can create a pattern for your graphic however you want—even draw it by hand. I use a personal computer and Microsoft Windows' Paint (in the Accessories folder). You work with lines, shapes, text, styles and sizes, and you can experiment with different color schemes—even zoom in and edit the image pixel by pixel! When you've finished designing, print out your pattern on a piece of the lightweight paper. Printing the pattern in light gray rather than black makes it easier to see exactly where the point of the knife is during the cutting process.

Next attach the pattern directly to the fuel-resistant vinyl trim sheet material with masking tape. You don't want your design to shift around even the slightest bit while you're cutting it.

Working on a well-lit surface, cut through the pattern and the trim material using the X-Acto knife—but not all the way through the protective backing. You'll quickly learn how much pressure it requires to accomplish this. Consider picking up an X-Acto no. X3241. This knife's swivel blade rotates 360 degrees for cutting curves, circles and designs. You'll wonder how you ever worked without it. If you do cut all the way through the protective backing in

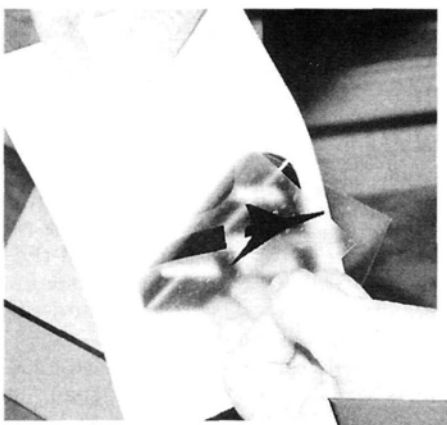


The printed graphic is taped into place over the trim sheet.



Carefully cut the pattern with an X-Acto knife. The material in and around the "D" has been "weeded out."

some areas, don't worry, as long as the backing is still in one piece and holds the design together. It's imperative to use a sharp blade! If you notice even the slightest pulling as you cut, change the blade; this will keep the edges of your graphic sharp. Take your time cutting out your design. A little time and patience will go a long way. Cut a curve, then lay your straightedge against the blade to cut a straight section, then a curve, and so on. Discard the paper pattern and "weed" out the background trim material with your knife and tweezers as you go. If you must stop cutting, be careful to get the blade back exactly where you left off before you continue.

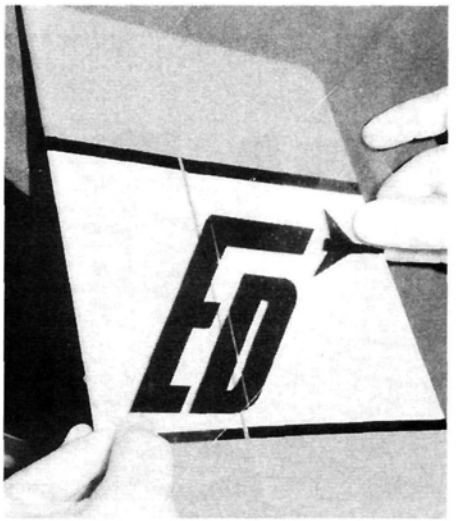


Remove the graphic from its protective backing with application tape.

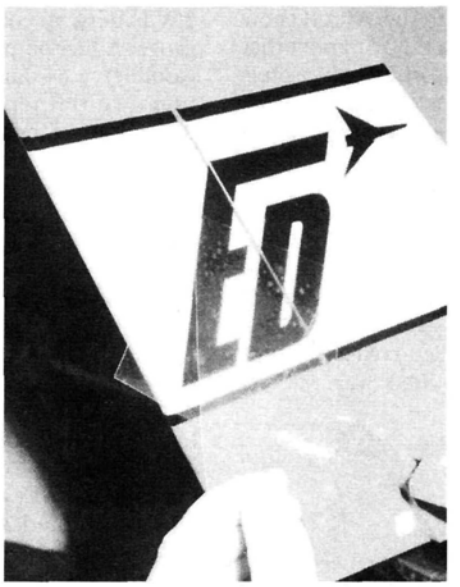
Mark guidelines on your model using a felt-tip pen where the graphic will be placed. For dark-colored models, mark temporary guidelines using those little yellow stick-on notes.

Transfer the graphic from its protective backing to your model using application tape (available in various sizes from any vinyl-sign-making shop or art-supply store). Stick the application tape over your graphic. Carefully peel the application tape from the trim sheet's protective backing and the graphic will now adhere to the application tape. Be particularly careful not to crease the graphic by bending it back too far or pulling it up too quickly. Creases won't smooth out after the graphic has been applied; you'll have to cut a new one.

Take your time, use your guidelines (transparent application tape makes it easier to see your guidelines), and gently lay the graphic down on the surface with a continuous, smooth motion, being careful not to trap air bubbles underneath. If you do trap a bubble, carefully pierce the graphic with the tip of your knife and smooth it out.



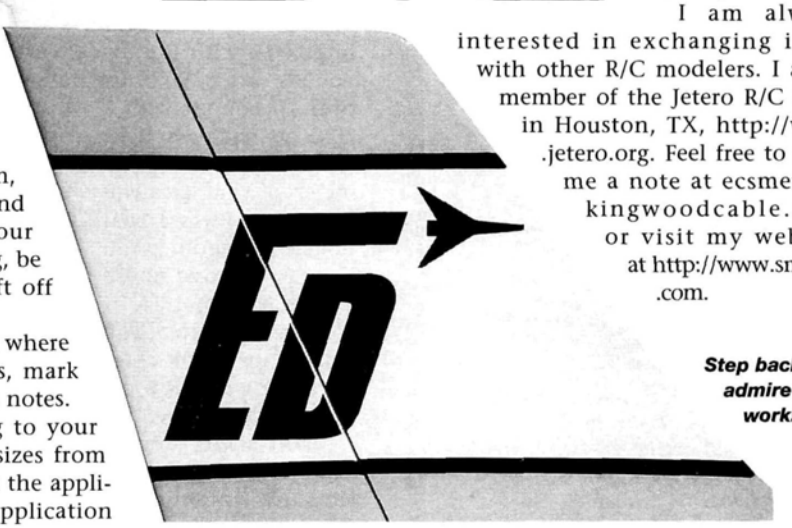
Above: position the graphic and smooth it into place. Below: remove the application tape and seal the hinge line's edges.



After the graphic has been applied, burnish it with a soft cloth. Carefully pull off the application tape by bending it back on itself while pulling up slowly (you don't want to pull the covering off your plane!). Use a trim sealing iron set on low to lay graphics over the edges of a hinge slot.

Now wipe off the guidelines with a damp cloth. To prevent fuel from seeping under the graphic, brush some clear dope around its edges or clearcoat it entirely. That's it; step back and admire your work!

I am always interested in exchanging ideas with other R/C modelers. I am a member of the Jetero R/C Club in Houston, TX, http://www.jetero.org. Feel free to drop me a note at ecsmetak@kingwoodcable.com or visit my website at http://www.smetak.com.



Step back and admire your work!

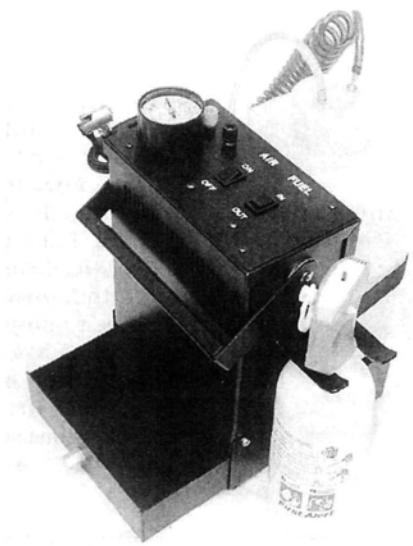
The WRAM show and converting glow to gas

The WRAM show is a great place to say goodbye to winter; after the show, flying season is just around the corner.

WHEN I HEAR everyone talk about going to the WRAM show in Westchester, NY, I know that the beginning of flying season is near. The 1999 show, as always, provided an opportunity to see old friends and to check out new products and models. If you live in the Northeast and have never attended this show, go at least once; there's no better way to say goodbye to winter.

My first stop at the show is always the Nick Ziroli Plans* booth. Nick Sr.'s latest creation is an 80-inch-span Ercoupe. This popular 1940s, twin-tailed civilian aircraft is Nick's choice for this year's Scale Masters competition. To ease transportation, Nick's model is very easy to take apart. Nick will probably power the Ercoupe with a gasoline engine, and the finished model will be a real beauty when we see it on the Scale Masters flightline.

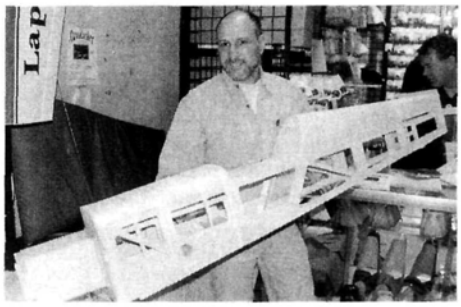
Nick Jr., also at the booth, showed me his new GSE 2000 ground-support unit. It is particularly useful to modelers who use retracts because it includes its own 12V battery, air compressor and air gauge. A fuel pump (safe for gasoline), a 64-ounce fuel container, high-quality rocker switches and a fire extinguisher are also included with the aluminum-housed support system. Its black powder-coated finish enhances durability.



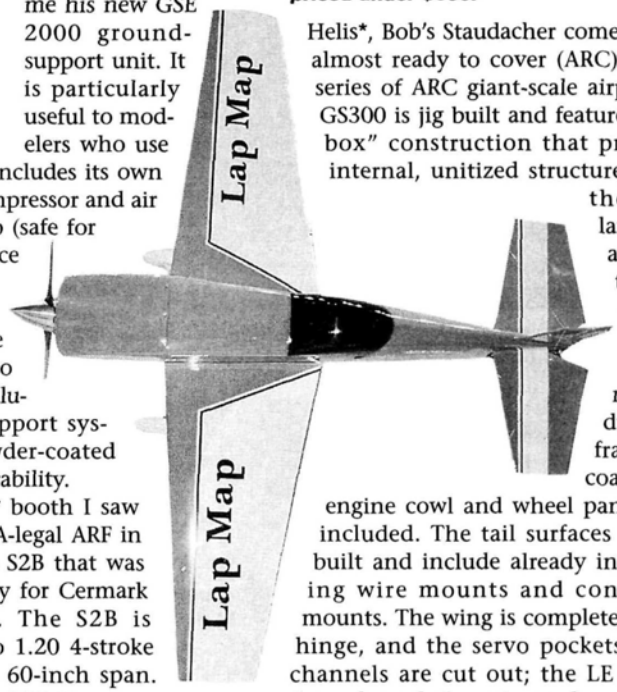
The GSE 2000 ground-support unit is available from Nick Ziroli Plans. This compact aluminum unit carries fuel and a fuel pump, an air compressor, an air gauge and a fire extinguisher.

In the Cermark* booth I saw an impressive IMAA-legal ARF in the form of a Pitts S2B that was designed exclusively for Cermark by Dave Patrick. The S2B is intended for .90 to 1.20 4-stroke engines and has a 60-inch span. One of Cermark's ARF Signature Series, it comes covered with Ultracote and features one-piece wings;—no ugly center-section seams to hide! I was equally impressed with the model's weight—9½ pounds with a .90 in the nose, and a little over 10 pounds with a 1.20. Its relatively light weight and 1,020 square inches of wing area will make the Pitts a real floater on landing. You just gotta love these new-generation ARFs.

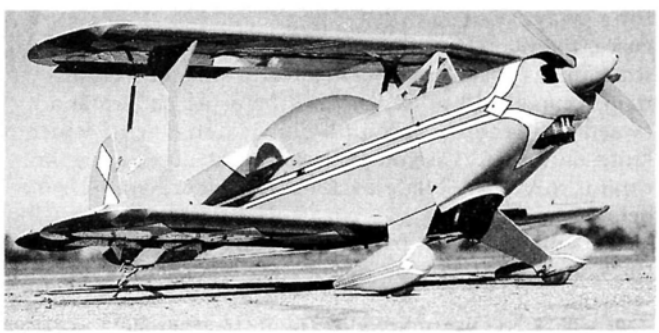
I ran into Bob Shapiro up on the stage area; he was showing off his impressive, 30-percent-scale Staudacher GS300. Available through Hobbies and Helis*, Bob's Staudacher comes built and almost ready to cover (ARC). First in a series of ARC giant-scale airplanes, the GS300 is jig built and features "engine-box" construction that provides an internal, unitized structure to which the engine, landing gear and wing tube sockets attach, thereby ensuring a rigid and durable airframe. A gelcoat fiberglass engine cowl and wheel pants are also included. The tail surfaces also come built and include already installed flying wire mounts and control-horn mounts. The wing is completely ready to hinge, and the servo pockets and wire channels are cut out; the LE is already shaped, and the wing tube sockets are installed.



Bob Shapiro shows off his new 30-percent-scale Staudacher GS300. Available from Hobbies and Helis, the ARC Staudacher is priced under $600.



Intended for a Zenoah G-62 engine, the 90-inch-span Staudacher's price is $599; not too bad, considering the amount of work already put into the airplane.



The new Cermark Pitts S2B ARF looks really promising. The .90- to 1.20-size biplane comes covered and features one-piece wings.

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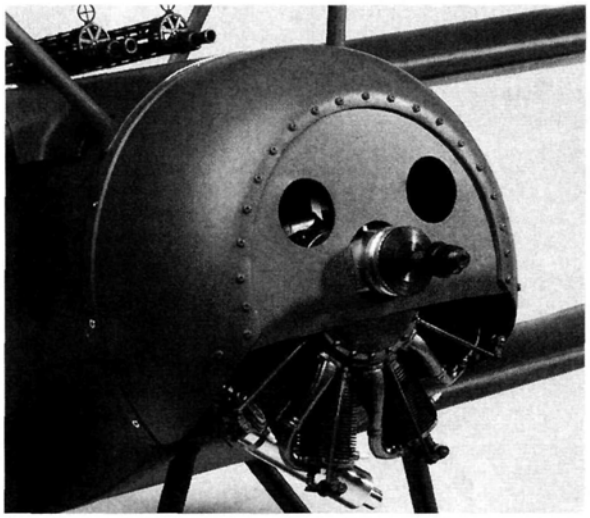
Everytime we sit down to do a new ad, we don't know where to begin. If we do an ad about our battery packs, people call wondering if we're no longer making kits or publishing *R/C Techniques* and *Electric Flight Techniques*. If we do an ad about our kits, people think we're no longer making battery packs for modelers or that we've stopped pubishing *Techniques*. It often seems like there's no right way to keep you informed about what's new at SR Batteries. • Well, all of that has changed! Thanks to the world wide web, WWW, we can now not only keep you up to date, we can keep you up to the minute! If we release a new kit, you'll read about it two or three *months* sooner at srbatteries.com . If we release a new *Techniques* volume, you'll read about it two or three *months* sooner at srbatteries.com . And finally, if we release a new cell or technical information about one of our packs, you'll read all about it *first* at srbatteries.com! Naturally, our site lists pricing and technical information covering all of our products. You'll find the sizes and weights of all of our packs and individual cells as well as photos, specifications, and descriptions of our ARF and laser cut kits. In addition, there's a detailed index to all of the volumes in the *Techniques* library. • SR Batteries, Inc., Box 287, Bellport, NY 11713, Phone: 516-286-0079, Email: info@srbatteries.com



Here's the Arizona Model Aircrafters aluminum cowl on my latest project. The flat-faced Dr.1 cowl comes in two parts and must be assembled by the modeler.

Bill Steffes won the Best Plane award with his really big (1/4-scale) SNJ-5 Texan. The model is built from enlarged Ziroli plans.

FOKKER COWLS

I also spoke with Jamie Johnston of Arizona Model Aircrafters*, who showed me his line of WW I accessories. I was looking for a scale, flat-faced Fokker Dr.1 cowl for my latest project, and the metal cowls he had on display caught my eye. A unique aspect of Jamie's line of scale aircraft kits and accessories is that almost everything in his catalog is available in several sizes; the most popular are 1/6-, 1/4-, and 1/3-scales. The metal Dr.1 cowls require you to install the thin, laser-cut plywood faceplate—a relatively easy task. For my model, I replaced the plywood faceplate with common aluminum roof-flashing and replaced the supplied machine screws with smaller, Phillips-head, sheet-metal screws. As you can see, the finished cowl is well worth the afternoon it took to assemble it.

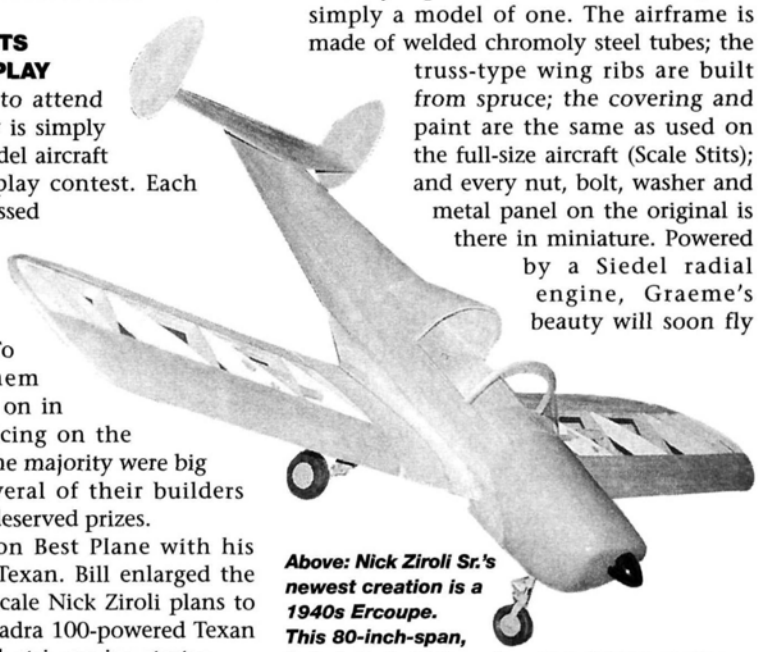
Jamie also has full-size (man-carrying) aircraft kits available for several of the designs he sells in model form. Talk about exact-scale model kits: the model plans are reduced CAD drawings of the full-size plans he sells to Experimental Aircraft Association builders.

GIANTS ON DISPLAY

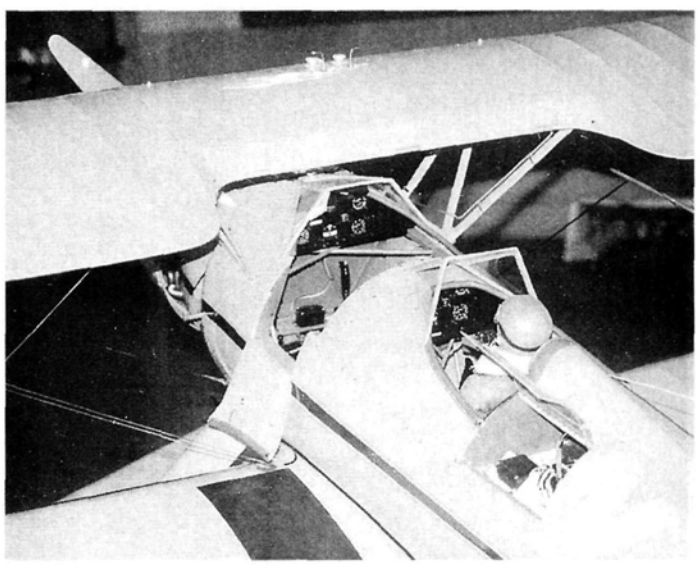
Another reason to attend the WRAM show is simply to see all the model aircraft in the static-display contest. Each year, I am impressed with the craftsmanship and engineering that goes into these models. To see many of them actually fly later on in the year is the icing on the cake. This year, the majority were big models, and several of their builders took home well-deserved prizes.

Bill Steffes won Best Plane with his giant-size SNJ-5 Texan. Bill enlarged the very popular 1/5-scale Nick Ziroli plans to 1/4 scale. Bill's Quadra 100-powered Texan has an onboard electric engine starter.

The overall Best in Show went to that "scale madman" from Canada—Graeme Mears—for his 1/3-scale Waco UPF-7 biplane. The word "impressive" doesn't begin to describe this aircraft; Graeme has literally reproduced a 1/3-size Waco, not simply a model of one. The airframe is made of welded chromoly steel tubes; the truss-type wing ribs are built from spruce; the covering and paint are the same as used on the full-size aircraft (Scale Stits); and every nut, bolt, washer and metal panel on the original is there in miniature. Powered by a Siedel radial engine, Graeme's beauty will soon fly



Above: Nick Ziroli Sr.'s newest creation is a 1940s Ercoupe. This 80-inch-span, twin-tailed civilian aircraft is Nick's choice for this year's Scale Masters competition.



Overall Best in Show winner Graeme Mears truly has outdone himself with his beautiful 1/3-scale Waco UPF-7 biplane. Everything is there!

This SuperTigre .90 has been converted to gasoline ignition operation. Nelson Aircraft Co. now distributes the ProSpark Ignition system that makes this conversion possible.

at Top Gun, so keep your eyeballs peeled for more on this one-of-a-kind airplane.

GLOW TO GAS CONVERSION

When you think of gasoline-powered engines, the first thing that pops into your mind is a big—2ci or larger—powerplant. Have you ever thought how neat it would be to run typical glow engines on inexpensive, easy-to-find auto gas? Earlier this year, while attending the Great Northwest Hobby Expo in Puyallup, WA, I found a SuperTigre .90 engine that had been converted to run on gasoline. Jerry Nelson of Nelson Aircraft Co.* now distributes the ProSpark electronic ignition system that makes this conversion possible.

The ignition system is powered by a 4-cell, 800 to 1,200mAh Ni-Cd battery pack and will operate for about 2 hours between charges. The rest of the system is comprised of an ignition module, a high-voltage coil, a shielded spark plug lead with a ¼-inch spark-plug boot, a Hall sensor assembly and attachment strap, a Hall effect magnet and a ¼-32NGK spark plug. The SuperTigre .90 is fairly simple to convert because its carb requires no modification to use gasoline. According to Jerry, the ProSpark system can be used on several converted glow engines, but there are a few things to consider before making the swap to auto gas.

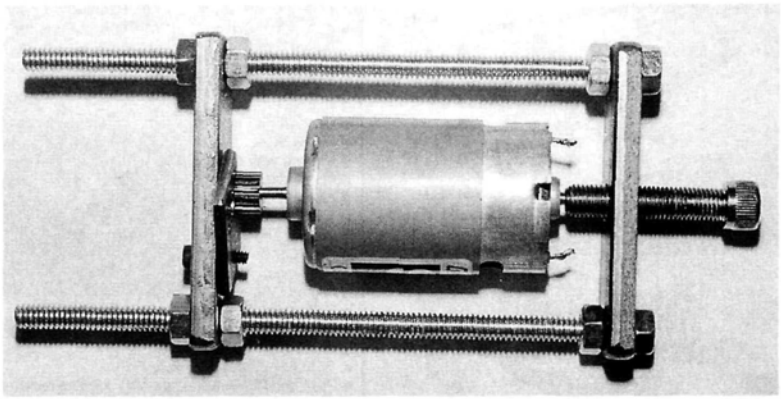
Engines with carbs not compatible with gasoline need a Walbro gasoline carb conversion, and Jerry has several to choose from. Fuel consumption is greatly reduced with a gas-converted engine, and you can install a smaller-than-normal fuel tank to save weight. The fuel lines and tank also have to be gas compatible. If you use a standard carb, a fuel pump, such as a Perry oscillating pump, is recommended. Other engines suited for the gasoline conversion are the O.S. 1.08, Thunder Tiger 1.08 and 1.20 and the SuperTigre 2500 through 4500 series. And, of course, the ProSpark system is available for all popular big bore, single and multi-cylinder gasoline engines.

When you operate a converted engine, all the same safety precautions common to gasoline engines apply; a small fire extinguisher would be a good addition to your flight box. Performance is said to be very good, with easy starting and good torque figures. I have a ProSpark-equipped SuperTigre .90 and once I get it into an airplane and have a chance to wring it out, I'll report my findings.

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.*

Installing and removing pinions

WE RECENTLY DISCUSSED a wide array of topics dealing with power systems, including how speed controls work, how motors are made and why they work, and how to properly time motors for specific applications. Now it's time to look at why we might change timing and adapt motors to new applications. You may want to change your direct-drive motor to be geared, or you may prefer to add a larger prop to enhance performance. Whatever the case, it's not hard to do, but there are right and wrong ways to do it.



This inexpensive Sky's the Limit pinion gear press is available from New Creations R/C.

Whether you use a gear drive or a belt drive, you'll need to install a pinion gear or pulley on the motor. With a gear drive, you'll also need to change the motor's direction so the prop will turn in the right direction; with a belt drive, the direction will remain the same. If you add a gearbox, go ahead and reverse the motor and make the necessary timing adjustments before you proceed. If you plan to do a project with a can motor and don't want to go through the reversal and timing exercises, it's worth investigating the Kyosho* Magnetic Mayhem reverse motor, as it already turns in the right direction for a gear drive.

GEAR TALK

At the risk of oversimplifying things, let me first explain that in a normal gearbox, there are two gears: the pinion, which fits on the motor shaft, and the spur gear, which is the large gear on the prop shaft inside the gearbox. There are exceptions, like planetary boxes and some titanium boxes, but the one thing they all have in common is that the motor must have a pinion gear. That's my purpose in this column: to describe how to properly install and remove pinion gears.

With any job, there are good ways and bad ways to do it; some folks might get away with doing it the "wrong" way, but that doesn't make it right. We've all done "field-expedient" repairs, but let's concentrate on methods we would use at home in the comfort of our shops. Proper equipment makes the job much easier but, in a pinch, you can install a pinion using a bench vise (preferably with a drill press).

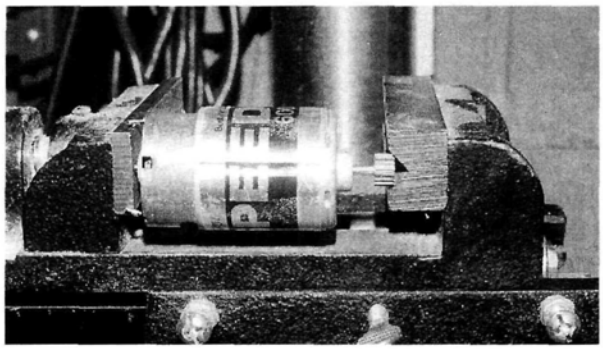
I prefer to use a tool that's specifically designed to install pinion gears; I think you'll find that it is money well spent. The tool I use was designed by All Up Last Down champion John McCollough and is distributed by New Creations R/C* for less than $30. On its pinion end, this tool has a plate in a normal gearbox with holes that accommodate a wide range of motors and let you see your progress. At the other end is a concave socket-head bolt that automatically centers the motor shaft as you place it in the motor. The outer threaded rods allow the end plates to be adjusted to fit every motor I've come across, and you can adjust the socket-head bolt to work with a lot of motors without having to adjust the outer plates. When everything is lined up, you only have to turn the socket bolt with an Allen wrench until the pinion is where you want it. One of the beauties of this tool is that you can also carry it in your field box for easy fixes.

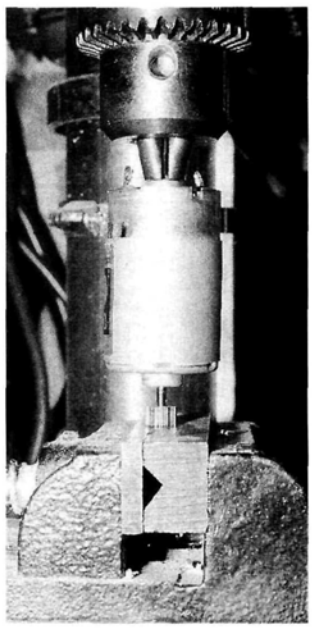
I mentioned before that you could also do the job with a bench vise and drill press. In the photos, I am installing a pinion in a standard Graupner* Speed 600 motor using my drill press and machinist's vise. My vise has "soft jaws" that are replaceable face surfaces that are softer than most metals and won't damage a brass pinion gear. If you look closely at the rear of the motor, you can see that it is placed in the vise so that the jaw presses directly against the rear of the motor shaft and misses the two terminals. The front of the motor shaft is placed in the pinion and then carefully aligned with the V-groove in the soft jaw of the vise. This is absolutely critical to avoid bending the motor shaft when you apply pressure, so take extra care to ensure proper alignment.

If you don't have a vise with soft jaws, protect the gear with some hardwood blocks. After you've pressed the gear onto the motor shaft, the end of the shaft will stick out, so it helps to drill a small hole in the hardwood blocks to accept the shaft. By using a vise with a V-groove, I can see how far I've pressed the gear onto the shaft.

For better results, use a drill press, too. I mount the vise on my drill press and square it up properly to the drill, then I chuck the motor shaft into the drill and lower it onto the

Below: installing a pinion in a standard Graupner Speed 600 motor using a machinist's vise with soft jaws. Right: I mount the vise on my drill press and properly square it up to the drill, then I chuck the motor shaft into the drill and lower it onto the pinion.

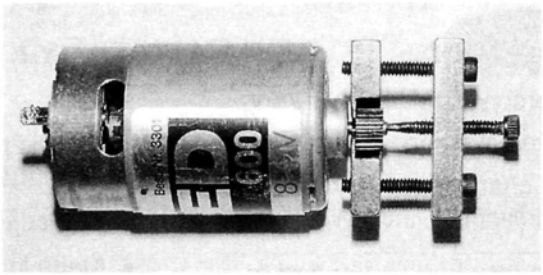




pinion, which is placed over a clearance groove in the vise top. I then use the drill press as a bushing press to lightly push the shaft through the pinion gear. To check your progress, simply return the drill to the raised position.

EVERYONE HAS AN "O"PINION

Now that you have the pinion on the motor, what if you decide to change ratios or gearboxes? What if you pushed the pinion too far onto the shaft?



A New Creations R/C pinion puller installed on a motor. You can see that the machined surface of the bottom plate fits perfectly against the gear and will not damage it.

Pinion removal tools are inexpensive and easy to find, and they're available for motor shafts of various sizes. Simply slide the tool around the motor shaft and hold the gear while the bolt presses the shaft out of the pinion.

A while ago, I picked up a pinion-removal tool for less than $12 at a hobby shop that caters to the R/C car crowd. The problem with this particular version was the way it rested against the bottom of the pinion gear. It's a steel ring and harder than the brass pinions, so if I had tried to remove a tight pinion, I might have damaged the edge of the teeth where they rested against the curved sides of the puller. Now I use a tool that's available for various shaft sizes from New Creations R/C. You can buy a combination set that will handle the smaller shaft sizes and another set for big motors (up to ¼-inch shafts). This tool is a bit more expensive, but if you do any number of pinion changes, it will pay for itself in the long run—especially because it won't damage the motors.

You may sometimes need to send a motor to a manufacturer to change the pinion. Some motors use pinion gears that are not a close fit on the shafts but are held in place with a commercial adhesive. Most of us use Loctite to prevent linkage screws from coming loose; other adhesive formulas are used to hold pinion gears on motor shafts, and these require that the assembly be baked to harden the adhesive. The fit of the pinion to the shaft is critical; if the pinion fit is too tight or too loose, the adhesive won't cure properly. It's very difficult to remove pinions that are held in place this way, and the shaft must be cleaned before another pinion can be installed. One of my custom-built MaxCim* motor setups has a pinion that's held in place this way, and I always send it back to MaxCim for pinion changes. The cost is minimal and the results are ensured.

Last, but not least, some pinions simply slide onto motor shafts and are held in place with grub screws, or setscrews. These pinions are easy to change, and you don't need special tools or skills to install or remove them. Use Loctite on each setscrew before you tighten it. I prefer pinions that use two setscrews that are 180 degrees apart to avoid any imbalance, but I haven't had a problem with ones that used only one setscrew. If you have one, file a small flat on the shaft to prevent the screw from slipping.

THE BENEFITS

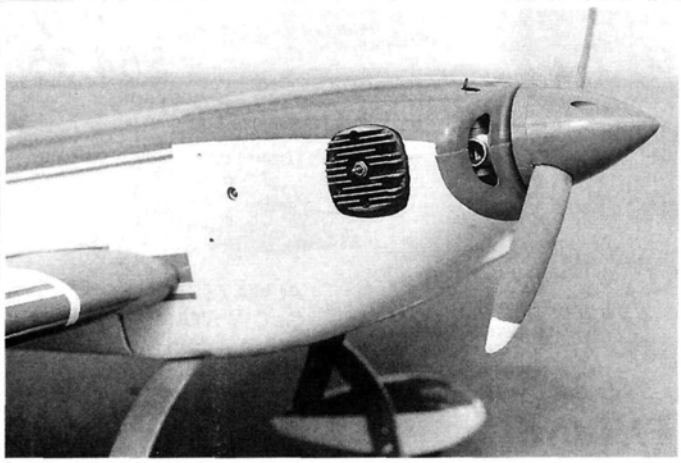
Now that you know how to install and remove pinions, more modeling options are available to you. Prolific designer Pat Tritle of Pat's Custom Models* recently offered two, 49-inch-span models that use the inexpensive Magnetic Mayhem motor in a 2.3:1 Olympus belt drive. (Use the standard motor—not the reversed version—with this belt drive.) This puts a very inexpensive motor/gearbox combination into a good-looking warbird, and that's something a lot of you have been asking for.

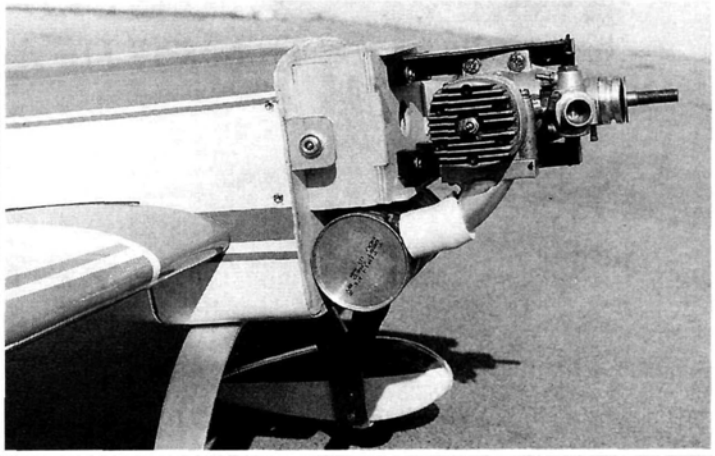
Pat Tritle of Pat's Custom Models holds 49-inch-span models that use inexpensive Magnetic Mayhem motors with 2.3:1 Olympus belt drives.

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.*

by Tony Newsom

Make a Concealed Muffler



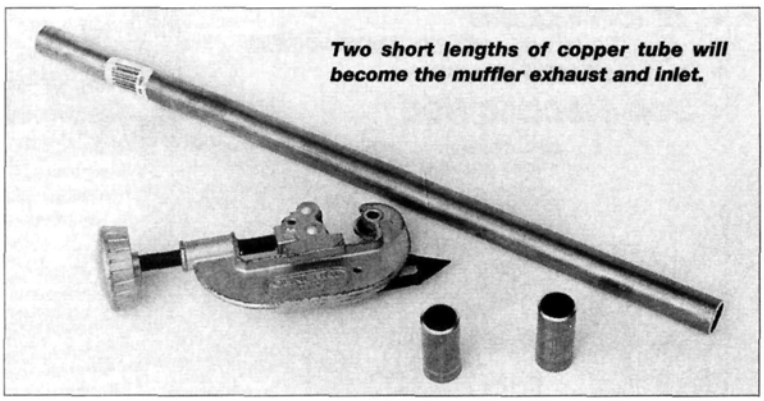


A simple solution to an exhausting problem

There ought to be a law against installing a big, bulbous stock muffler on a really nice-looking airplane. I've always felt that a muffler detracts from a plane's good looks, so whenever possible, I enclose it in the cowl. The plane looks better and is cleaner aerodynamically. The downside is that you have to spend some extra cash on a new muffler that may not fit your application. Here's a way to make your own mufflers and customize them to fit your model exactly.

The supermarkets are full of potential expansion chambers for mufflers. I found a tin can that was an ideal size for .40- to .60-size models such as an Extra, Corsair, P-51 Mustang and CAP 21. The juice can I used is about 4 inches tall and 2 inches in diameter. You'll need to make your own header or buy one for the engine you intend to use, and you'll need a short silicone connector. These items will be the most expensive pieces of the project, but keep in mind that barring any damage to the header, you can use it over and over on future models. In addition, you will need two tin cans, silver solder, flux, copper tube and a heat source such as a propane or butane torch. Most modelers have everything else needed: an electric drill, round file and a tube cutter or hacksaw.

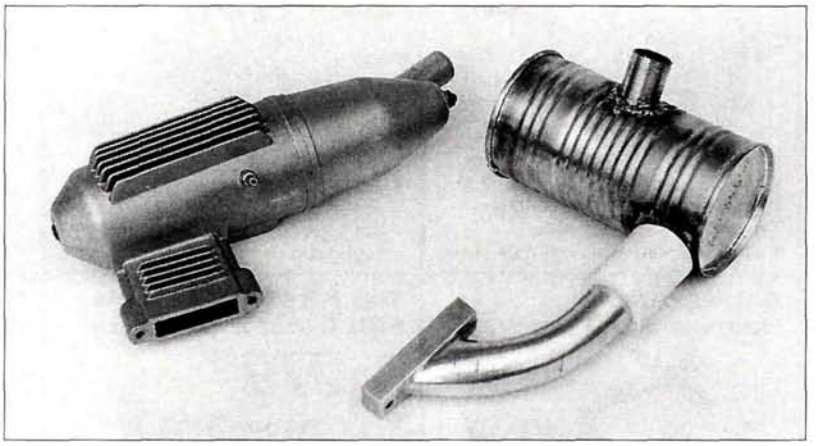
Left: you'll need two tin cans; the end of one will be soldered onto the pop-top end of the other, which will become the muffler. Right: make the inlet and exhaust holes where they best suit your application.



Two short lengths of copper tube will become the muffler exhaust and inlet.

Attach the header to your engine, and mount the engine onto the plane so you can see where the expansion chamber fits best in the airframe. Use a can opener to remove the end of one of the cans. Solder this end over the pop-top end of the second

can; the second can will become the muffler. Cut two pieces of ½-inch-diameter copper tube to suit your application (mine are about 1½ inches long). Use a marking pen to indicate where the inlet, outlet and pressure fittings will be positioned. Remember, you can place these tubes anywhere you like, so think about where you want the inlet and where the exhaust will exit the plane.



A stock muffler versus the homemade juice-can muffler.

Use an electric drill and round file to make the holes for the copper tubes. The tubes should fit snugly into these holes, so proceed slowly and check the fit often. Use a wire brush to remove any paint around the holes down to the bare metal. Insert one of the short copper tubes into a hole and put a coat of flux all around. Use the torch to heat both the can and the tube, then feed in the solder. Solder the second tube into position, and your expansion chamber is just about finished. Make sure the solder you use is the type used in the plumbing industry—not electronic solder!

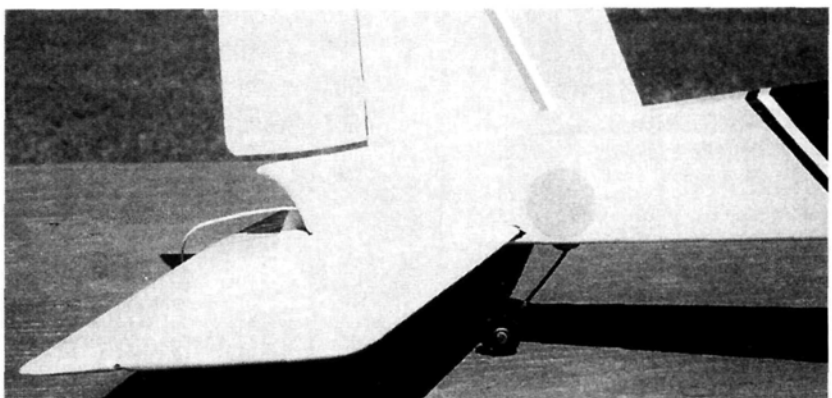
You can use the wire brush in an electric drill to remove the rest of the paint from the can and give the muffler a bright, brushed finish. You should mount the muffler rigidly to the firewall or bulkhead using metal straps cut out of thin copper sheet. Mount the header to the engine, then use the silicone coupler to join the muffler to the header. The coupler helps to isolate the muffler from vibration.

The juice-can muffler I've shown here fits inside the cowl of my .60-size Extra. The expansion chamber fits across the width of the fuselage, and the output tube exits from the bottom of the cowl. I've cut slots along the bottom of the cowl under the muffler for cooling. ✦

MODEL AIRPLANE NEWS
HOW TO

Build a Steerable Tailwheel

A turn for the better!



PHOTOS BY WILLIAM R. NIELSEN JR. & WALTER SIDAS

By William R. Nielsen Jr.

I have never been completely satisfied with the standard, steerable tailwheel assemblies available for small to midrange models. They were either difficult to mount or awkward and unsightly. Several years ago, I resolved to find a better way. I believe I have succeeded, and it is a simple arrangement I have used many times.

The system described here is fairly easy to construct and can be adapted to most models during construction. My tailwheel design can also be used with existing models, but you may need to modify the model.

YOU WILL NEED

- Music wire (use 1/16-inch wire for mid-range models, 3/32-inch for larger and .047-inch for smaller models).
- Three small washers with an inside diameter (i.d.) that matches the music wire and a single washer with an outside diameter (o.d.) of at least 1/4 inch.
- Brass tube with a matching i.d. and one 1/4x3/4 pan-head nylon machine screw (bolt).
- A Du-Bro* tailwheel with diameter to suit the model (other brands can be used, but I prefer these because of their wide, machined-aluminum hubs).
- Solder and flux (I use Stay-Clean or Stay-Bright).
- A 3- to 4-inch-long piece of 3/4x1/4-inch plywood or very hard balsa;
- A short length of Nyrod or a pushrod and clevis.

MAKING A DRILLING JIG

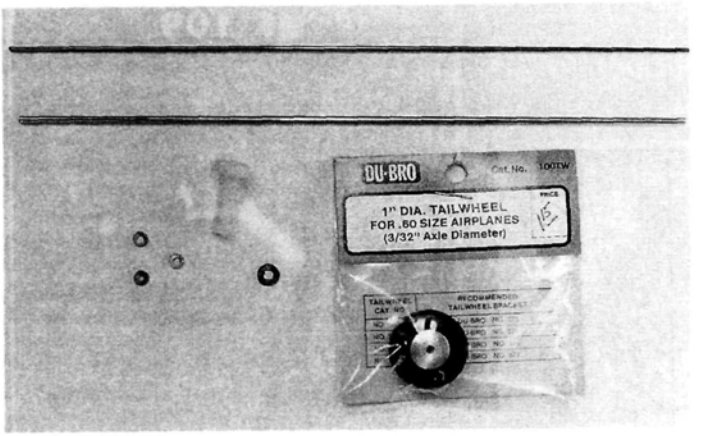
It isn't essential, but a drill press is highly desirable for all drilling and, if you plan to make more than one or two tailwheels, you should make a drilling jig. To do this, fasten a 4- or 5-inch strip of 3/32-inch-thick, 3/4-inch-wide iron or brass plate to one face of a scrap hardwood block with a screw at each end, in opposite corners. Then, drill the plate for the wire sizes you will use. Use a no. 54 drill for .047-inch wire, a no. 50 for 1/16-inch and a no. 37 or 38 for 3/32-inch wire. Make these holes about 3/4 inch apart, through the metal and wood. Temporarily remove the metal plate, turn the block over and, with a 1/2-inch-diameter bit, drill (countersink) the holes about 1/2-inch deep, then drill 3/16- or 5/64-inch-diameter holes the rest of the way through. Now tap the holes with a 1/4-20 tap. Replace the plate, and you have a clever, simple, drill jig that makes it easy to drill nylon bolts. Many thanks to Charlie Brandon for his suggestions for making this jig.

Screw the nylon bolt into the jig, and tighten it so that the drill will not loosen it. Don't rush the drilling, and don't turn the bit too quickly. After you've drilled the bolt, remove it from the jig and make sure that the wire is snug but still can turn. You may need to increase the hole one bit size, but you don't want a sloppy fit!

MAKING THE TAILWHEEL

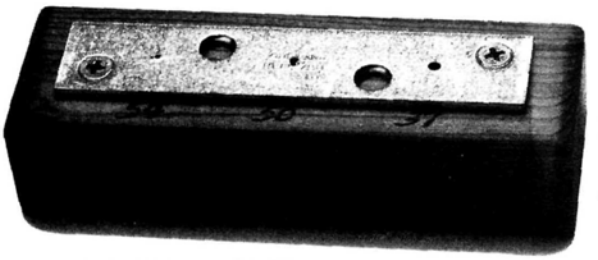
Cut about a 5-inch (or longer) length of music wire and bend it to the desired yoke shape. An inch or so above the top of the yoke, bend it back 15 degrees from vertical. This will provide good tracking. This uppermost bend is where the large washer and one smaller washer will be soldered to create a bearing surface against the head of the nylon bolt. Now bend one end of the brass tube 90 degrees, forming an arm that's more or less 1/2 inch long. Do not bend it at a hard angle, but rather with a radius, as shown in the diagram. Flatten the end of the arm horizontally and drill a hole to suit the type of clevis you use. Now cut the tube off about 1/2 inch below the bend. Put the wire through the nylon bolt, and cut the bolt so that when you place it on the wire, the tube (steering arm) will just clear the bolt (about 1/32 to 1/16 inch of clearance will be fine).

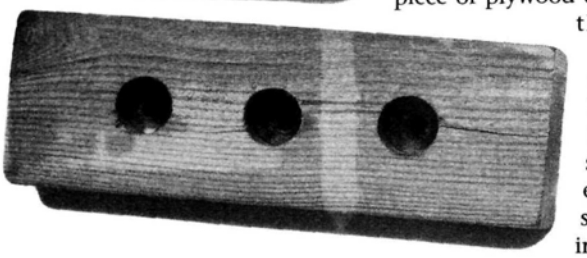
Remove the wire and solder the upper end of it (the bend above the yoke and both ends of the axle); don't use too much solder. Also put a small drop of flux



The materials required (other than solder) are a suitable tailwheel, music wire, brass or aluminum tube, four washers and a nylon 1/4-20 bolt.

in the end of the tube that slips over the wire and tin the tip. Replace the wire through the bolt. Put the steering arm on the wire at 90 degrees to the thrust line. Now, quickly solder with a minimum of heat to avoid damaging the nylon bolt. Solder a washer at the inboard end of the axle. If you're using wire of a smaller diameter than the hole through the tailwheel, you may need to use a brass or aluminum sleeve on the axle. This should be about 1/32 inch longer than the thickness of the wheel hub. Slide the tailwheel on and solder the outer washer to the axle. Go easy on the solder!



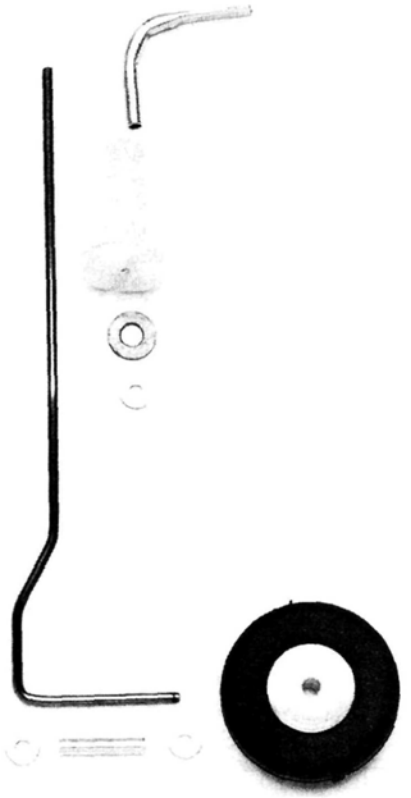


The bolt-drilling jig. Note the holes for three sizes of music wire; underneath, the holes are countersunk to accept the nylon bolt.

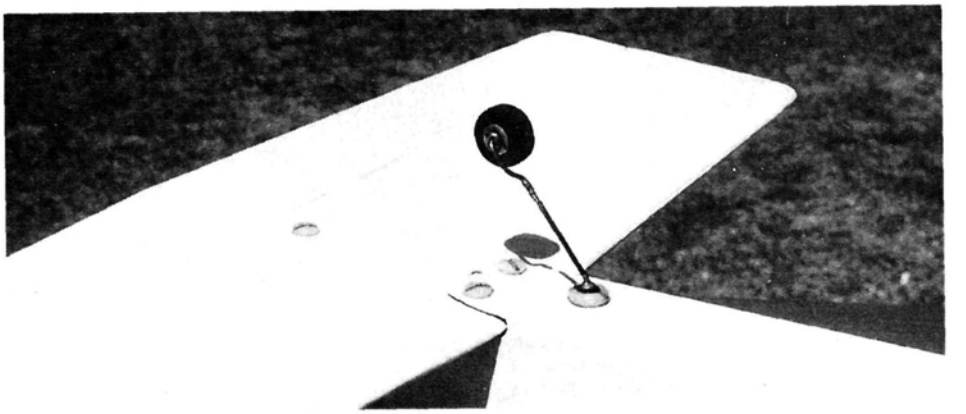
Drill and tap the 3- to 4-inch piece of plywood or hard balsa for the 1/4-20 bolt and mount it into place in the bottom of the fuselage, making sure it is far enough forward so that the steering arm clears the sides and any interior structures. Ease the steering arm through the bolt hole and screw it tightly into place. If your model's fuselage is made out of sheet balsa or plywood, you may have to cut an access hole for the steering arm. Use a 1 1/4- or 1 1/2-inch washer as a guide for your knife and, after connecting the clevis to the arm, patch the hole with covering material. This is easily removed if the tailwheel accidentally becomes disconnected or needs to be replaced.

Now connect the Nyrod/pushrod to the steering arm and the rudder servo, and the project is complete! Use about half the throw you have on rudder, and you will have very responsive yet controllable steering.

**Addresses are listed alphabetically in the Index of Manufacturers on page 134.*

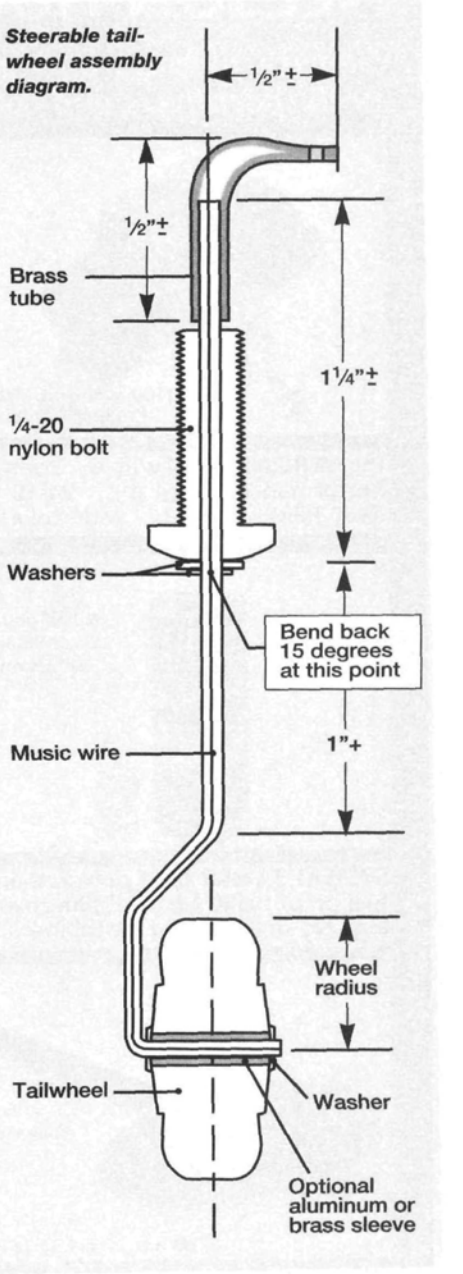


The tailwheel components are ready to be assembled.



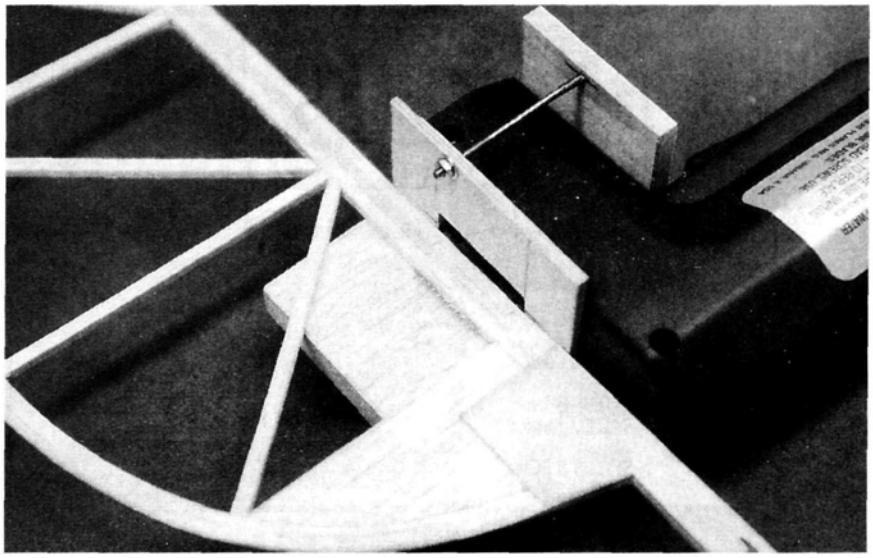
Installed and ready to go!

Steerable tailwheel assembly diagram.



MODEL AIRPLANE NEWS
HOW TO

by John Tanzer

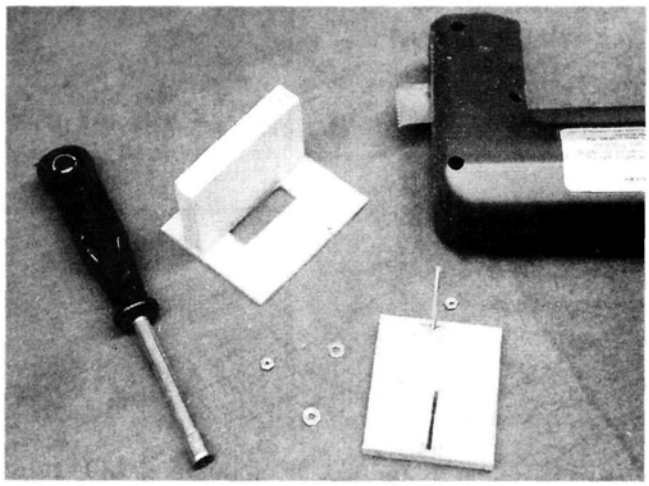


After you attach the jig to the Slot Machine, tighten the nuts on the 2-56 rods to lock the jig into place.

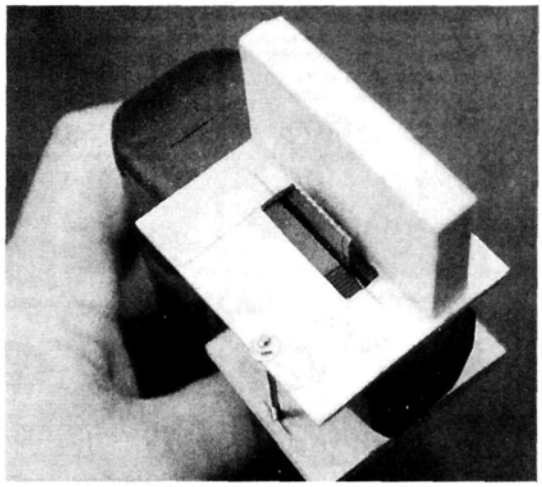
Build a Jig for Great Planes' Slot Machine

I HAD USED MY Great Planes* Slot Machine before I read the review in the April '99 issue, and I also thought it was the greatest thing since sliced bread. I had one complaint, though: while cutting slots in my Lazy Bee's 1/8-inch-thick stab and elevator, I sometimes didn't get the tool centered just right, so I decided to make a jig for it (it's similar to an adjustable fence on a table saw). What I came up with is a simple tool made of ply and balsa.

Cutting hinges has never been easier!

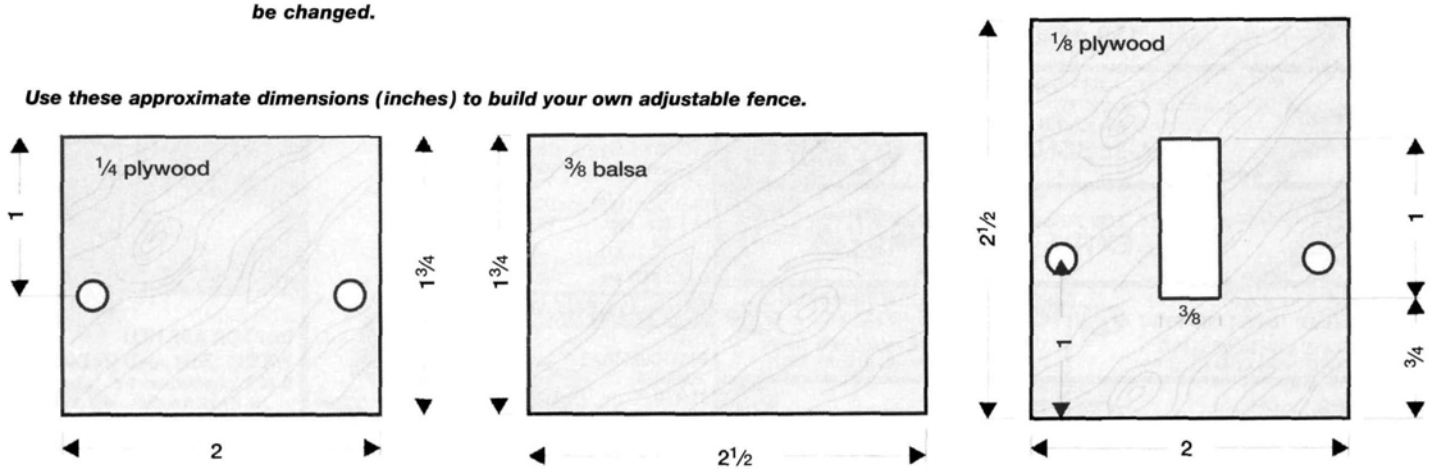


Note that the distance between the blade and the table can be changed.



Bring on the hinging surfaces!

Use these approximate dimensions (inches) to build your own adjustable fence.



The table is made of 1/8-inch ply, the base plate is 1/4-inch ply, and two 2-56 rods with nuts and washers allow adjustment. The fence is 3/8-inch balsa CA'd to the table to form a rigid, 90-degree angle. This homemade jig can be adjusted from 0 to 3/8 inch, and you can use it with the Slot Machine to cut centered slots in 1/8- to 3/4-inch balsa. The jig will not work on a tapered surface unless a shim is used to provide a constant thickness. Using the jig will cause the loss of 1/8 inch in the depth of the cut, but you can remove it from the Slot Machine and finish the cut to full depth.

To use the jig, use the Slot Machine's center marking tool to find the center of the surface, adjust the fence so the blade is centered, lock the table and cut the slots. They will be exactly centered.

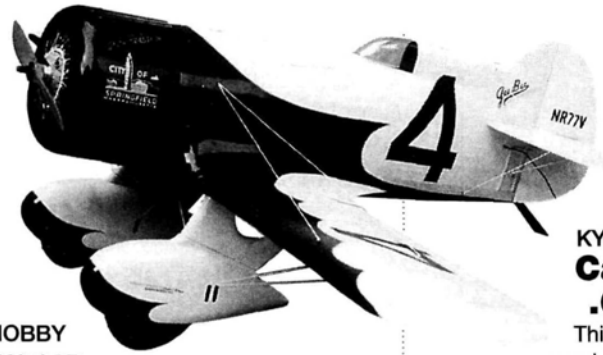
Now my Slot Machine is perfect. Take the time to make an adjustable fence for your Slot Machine; you won't regret it.

PRODUCT NEWS

Latest product releases

INFORM YOUR CUSTOMERS! **Model Airplane News is interested in showing our readers your new products—here in Product News. If you'd like to see your products here, send us clear photos and a press release that provides information about them! We'll publish as many as space permits.**

Send your announcements to: Product News, Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606 USA.



HOBBY HANGAR

Gee Bee Z

This classic air-racer kit is now available in an easy-to-build size. The laser-cut kit features vacuum-formed cowl, wheel pants, canopy, full photo instructions, formed landing gear, rolled plans and hardware package. Specifications: wingspan—57 inches; length—35 inches; weight—5 to 6 pounds; engine required—.40 to .46 2-stroke or .50 to .56 4-stroke.

Kit no.—HGR220; **price**—$119.99 (decal set with detail lettering—$10).

Hobby Hangar, P.O. Box 417, Hebron, KY 41048; website: www.hobbyhangar.com.

GLOVES IN A BOTTLE

Protective Lotion

Several products and chemicals in the hobby can dry, crack and chap your hands. Gloves in a Bottle is a lotion that protects against irritants such as glues, paints, epoxies, solvents and resins for four or more hours. It is absorbed completely, so there's no sticky or greasy feeling. Nontoxic, non-allergenic and fragrance free, Gloves in a Bottle protects hands by helping retain the skin's natural moisture.

Price—$4.95 (2-ounce bottle).

Gloves in a Bottle, P.O. Box 615, Montrose, CA 91209; (800) 600-1881; website: www.glovesinabottle.com.

KYOSHO

Caliber .60

This advanced machine signals Kyosho's entry into the competition-level market, and it is aimed toward the serious helicopter pilot who seeks performance and precision. The extremely rigid (less flexing), milled-aluminum "ladder-frame" has prefitted capscrews that reduce building time. The new design weighs less and produces less noise and power-robbing vibration. Other highlights include a two-stage drive-reduction system, belt-driven tail rotor, straight-linkage servo layout and carbon-fiber-reinforced fiberglass canopy. Specifications: length—55 inches; width—7.3 inches; height—18.5 inches; rotor span—60 inches; weight—approximately 10 pounds; engine required—.61 2-stroke.

Kit no.—KYOE0299; **price**—$3,199.

Kyosho; distributed by Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.

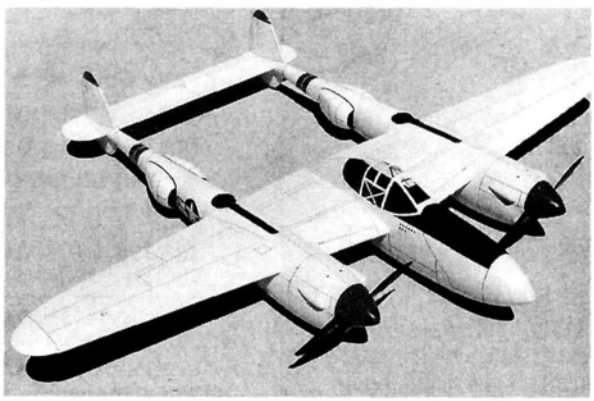
SPECIALTY PRESS

WarbirdTech, Volumes 18-21

Four new, 100-page soft-bound books, each with 164 photos, have been released in the WarbirdTech aircraft series. Volume 18 features Larry Davis and David Menard's research on the Republic F-105 Thunderchief, and in Volume 19, Steve Pace covers the B-1 Lancer. In Volumes 20 and 21, Dennis Jenkins looks at the A/OA-10 Warthog, as well as the Boeing/BAe Harrier.

Order no.—SP011 (F-105); SP012 (B-1); SP013 (A-10); SP014 (Harrier); **price**—$16.95 each volume ($4.95 S&H per order).

Specialty Press, 11481 Kost Dam Rd., North Branch, MN 55056; (800) 895-4585; fax (651) 583-2023.



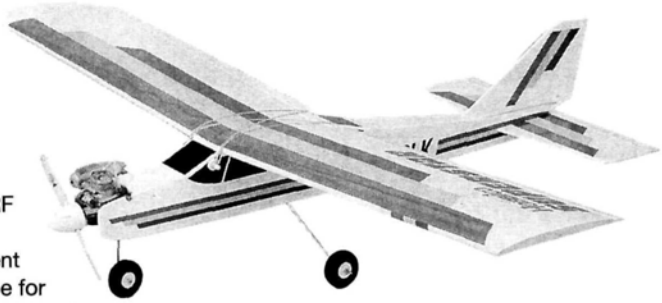
K&A MODELS UNLIMITED

P-38 Lightning Electric

This warbird was designed to be forgiving in flight yet comfortable in all areas of its speed envelope, thanks to its specially designed airfoil. It comes complete with fiberglass pod and tail booms, ABS vacuum-formed cockpit floor, canopy and instrument panel, and a balsa-over-foam wing construction with the cutouts for servos, wire leads and landing gear. Specifications: wingspan—50 inches; wing area—350 square inches; weight—40 to 43 ounces; motor required—Speed 400; radio required—4-channel.

Price—$199.99 (plus $11.99 S&H).

K&A Models Unlimited, 2835 Prenda De Oro NW, Albuquerque, NM 87120; (505) 836-3681; fax (505) 836-3798; website: www.kamodels.com.



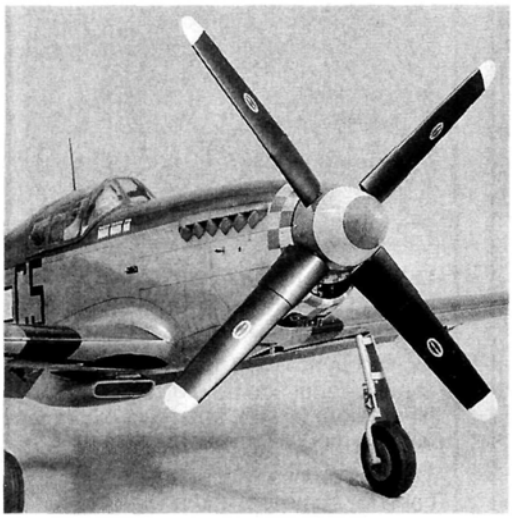
HOBBICO

SuperStar .40 AWARF

Hobbico has released its latest trainer in the AWARF series (all wood almost ready to fly). Ninety percent of the work has been done for the builder; the rest is a matter of gluing together the covered main assemblies, bolting on the engine and installing the radio gear. With its large, flat-bottomed wing and self-righting characteristics, the SuperStar was designed to inspire confidence in new pilots. The kit includes the fuel tank, engine mount, pushrods, spinner and more. Specifications: wingspan—60 inches; wing area—660 square inches; weight—5.5 pounds; engine required—.40ci; radio required—4-channel.

Kit no.—HCAA2020; **price**—$149.99.

Hobbico; distributed by Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.



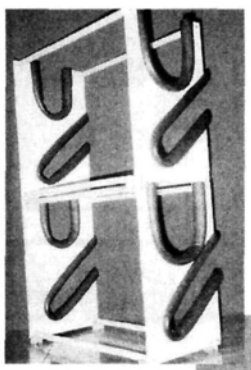
TOP FLITE

Giant P-51B Mustang Display Propeller

Precision vacuum-formed to match the true scale profile of the P-51B, this stylish 4-blade propeller is a must-have accessory for static display. Display props are also available for other Top Flite warbirds.

Part no.—TOPQ7909; **price**—$24.99.

Top Flite; distributed by Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.



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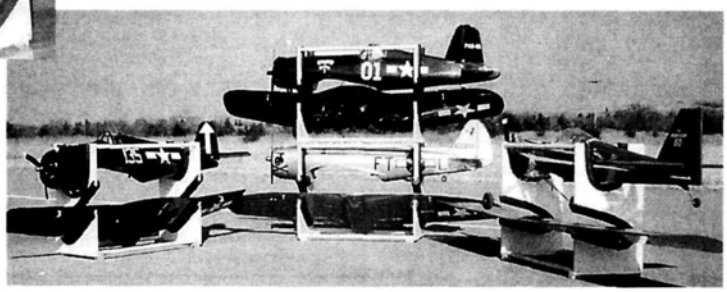

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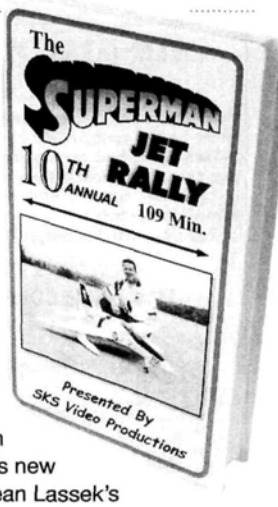

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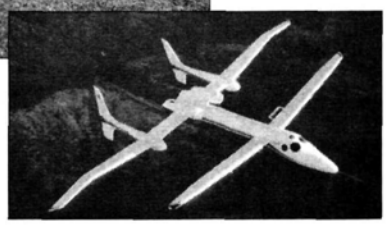

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Congratulations to Bill Riley of Avon, OH, who correctly identified the May '99 issue's mystery plane. The Proteus is the 30th new design to roll out of Burt Rutan's Scaled Composites factory since 1982. The plane's modular structure incorporates extendable wings and canard tips to accommodate a wide variety of uses, including reconnaissance, atmospheric research and satellite launching. The design garners its name from the mythological Greek sea god who could change his shape at will. The Proteus is right at home in *Model Airplane News* among the other R/C airplanes, as it is also intended for use as a UAV (unmanned aerial vehicle).

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To Russia with love

Before Bell, McDonnell Douglas and Mikhail Mils, Igor Sikorsky stood out as a giant among both helicopter and fixed-winged aircraft designers. Sikorsky (1889-1972) is remembered as the designer of the world's first production multi-engine bomber, the giant Russian Ilya Muromet. During the four long years of WW I, however, he also designed and built several successful biplanes. His best fighter biplane design was the S-16. A prominent aircraft in the 7th Fighter Detachment of the Russian Air Force, it successfully flew against Austria.

Like other planes of its day, the original version of the S-16 was intended to be an unarmed scout, but the Russians quickly realized that it had potential as a combat plane. Russian engineer Lavrov armed it with a single Colt machine gun that was synchronized to fire through the propeller arc. Power came from an 80hp Gnome-Lambda rotary engine with seven cylinders up front. The engine was enclosed in a streamlined cowl, mostly to contain the oil from the engine, which rotated to provide cooling.

Above: the restored full-size S-16 at the Bridgeport, CT, airport. Below: Connecticut Model Airplane Club members built this 1/4-scale S-16 using photos and measurements taken of the original.

Not a single complete S-16 has survived the ravages of the War and time, but under the direction of, and funded by, Sikorsky Archives, a full-size replica was built in Stratford, CT. Most of the main parts came from Russia, but others were made in Connecticut, and all the restoration work was done by volunteers under the watchful eye of Serge Sikorsky.

The project took two years to complete. The rotary engine was lent by the Rhinebeck Aerodrome in upstate New York, and other parts were donated by or bought from collectors throughout the U.S.

In January 1997, the restored Sikorsky S-16 was unveiled at Bridgeport Airport in Connecticut. It is the only full-size S-16 replica in existence, and officials have not yet decided on its final resting place.

The bare-bones model is ready to be covered.

TOO GOOD NOT TO MODEL

Connecticut Model Airplane Club members Morris Pittorie and Harry Hastedt had access to the plane during its restoration and were able to take many photos and measurements. Club members decided that scratch-building a ¼-scale model of the S-16 would be quite a unique project.

Construction went quickly, despite the fact that the complicated dual-landing-gear system and engine cowl had to be hand-crafted. The model was equipped with a US .41 gasoline engine, a Futaba 6XA radio with six servos, and a 1300mAh battery pack. Construction was aided by the engineering skills and graphic artistry of Pittorie and Hastedt, who completed the model in about a year and a half. The 19-pound biplane was finished with antique Solartex and spray-painted with cream dope. The fuselage and wings have hand-drawn and painted insignia and graphics.

Club members intended to fly the model S-16, but Sikorsky Archives in Stratford, CT, heard of the project and asked to see it. The officials were very impressed and wanted it for a special exhibit in the Moscow Polytechnical Museum that was scheduled to celebrate the 110th anniversary of Igor Sikorsky's birth. Everyone agreed that the model would best serve the memory of Igor Sikorsky as a display piece. It was an honor to contribute to the Sikorsky Memorial Exhibit, and the club members' only regret is that they don't know how the model would have flown.

Before sending the model to Moscow, Pittorie and Hastedt removed the electronics, fuel tank, plumbing and fit a dummy radial in the cowl; older servos were installed to keep the flying surfaces rigid.

In April 1999, the Sikorsky Archives air-shipped the model to the Moscow Polytechnical Museum, where it is on permanent display for viewing by the general public. So when you're next in Moscow ... !